MONTHLY WEATHER REVIEW.

Editor: Prof. Cleveland Abbe.

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INTRODUCTION.

The Review for December, 1896, is based on 2,748 reports from stations occupied by regular and voluntary observers, classified as follows: 137 from Weather Bureau stations; 33 from post surgeons, received through the Surgeon General, U. S. Army; 2,435 from voluntary observers; 96 received through the Southern Pacific Railway Company; 14 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 33 from Canadian stations; 1 from Hawaii; 30 from Mexican stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

The Weather Review is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the statistical tables are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data. Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada, Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu, and Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

The first half of the month was characterized by rather more than the usual amount of clear sky and pleasant weather; the latter half had the usual average number of storms, which mostly passed along the borders of our territory, leaving the month as a whole characterized by pleasant weather except in Washington and Oregon. The temperatures were generally above the normal, and the accumulated temperatures continued to show a large excess in the Rocky Mountain Plateau Region, the Lake Region, the Gulf States, and the intermediate districts. The precipitation was in excess in Washington and Oregon, but deficient in the Middle Atlantic and New England States.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The *mean pressures* during the current month were high in the Rocky Mountain Plateau Region, the southern portion of the Appalachian range, and the Gulf States generally. They were low at the extreme northern border of our weather map and lowest from the State of Washington westward and from Newfoundland eastward.

The highest pressures were: In Canada, Ottawa, 30.21; Kingston and Port Stanley, 30.18; Toronto and White River, 30.17; Montreal, 30.16: in the United States, Idahc Falls, 30.32; Salt Lake City, 30.31; Chattanooga, 30.29; Lander and Knoxville, 30.28; Parkersburg, Lynchburg, and Atlanta, 30.26.

The lowest were: In Canada, St. Johns, N. F., 29.82; Prince Albert, 29.90; Calgary, 29.91; Victoria, 29.92; Edmonston, 29.95; Medicine Hat and Sydney, 29.96: in the United States, Tatoosh Island, 29.91; Fort Canby, 29.95; Seattle, 29.97; Havre, 29.99.

As compared with the normal for December, the mean pressure was in excess in the Lake Region and New England and to a less extent in the Rocky Mountain Region and Gulf States. It was deficient in the Missouri Valley, Washington, Oregon, and the northwestern Canadian Provinces. The greatest excesses were: at Canadian stations, Kingston, Halifax, Montreal, and Saugeen, 0.13; Rockliffe and White River, 0.12; Quebec, Toronto, Port Stanley, and Parry Sound, 0.11: in the United States, Northfield and Buffalo, 0.13; Oswego, Albany, Erie, Toledo, Detroit, Sault Ste. Marie, and Green Bay, 0.12. The greatest deficits were: Canada, Calgary, 0.21; Medicine Hat, 0.14; Swift Current, 0.13: United States, Havre, 0,16; Miles City, 0.12; Rapid City, 0.10.

As compared with the preceding month of November, the pressures reduced to sea level show a rise in the Lake Region and especially in the Rocky Mountain Plateau Region; but a fall in Oregon, Washington, the Missouri Valley, and the Atlantic Coast, and especially in the Canadian Maritime and Northwest Provinces. The greatest rises were: El Paso, 0.15; Idaho Falls, 0.14; Salt Lake City, 0.13; Corpus Christi, Phœnix, Yuma, and Santa Fe, 0.12. The greatest falls were: Edmonton, 0.41; Calgary, 0.35; Battleford, 0.34; Prince Albert, Swift Current, and Banff, 0.29; Havre, 0.28; St. Johns, N. F., and Spences Bridge, 0.21.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. Hazen.

During the month eight high areas and twelve low areas have merited attention. Charts II and I give the tracks of these conditions, together with the position of each at 8 a. m.

and 8 p. m., and the barometer reading at the center twice each day. It should be noted that while these tracks, especially of the high areas, seem to be well defined, oftentimes the centers can not be exactly ascertained, and the definite lines are sometimes misleading, as though indicating a steady advance of a condition which may be extremely erratic in its apparent movement. We shall obtain a very inadequate idea of the actual weather of the month by a study of these tracks or of the accompanying developments of the high and low areas. It is necessary to take a broader view and to determine whether there were general conditions governing the weather over large regions. It is rather remarkable that the temperature conditions of December were almost exactly reversed from those in November. In the extreme northwest in December we find almost the warmest month of the twenty-seven during which we have observations, while in November it was the coldest of the twenty-seven. If we compare the tracks of high areas in the two months (Chart II) we shall find them almost exactly identical. There is a slight difference, however, in that there was a subpermanent area of high pressure, December 17–23, in the central plateau which had no counterpart in November. On the South Atlantic Coast also the high areas will be found hovering over eastern Tennessee, Kentucky, and central and western North and South Carolina, instead of passing into the ocean as they did in November. A fuller discussion of this question will be found in "Special Contributions."

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	52	104	4 p. m.	43	63	2,500	3.5	739	30.8
*Ia	3, p. m.	38	78	7, a. m.	33	78	640*	3.5*	183*	7.6
II	5, p. m.	40	125	12, p. m.	31	79	3,430	7.0	490	20.4
III	12, p. m.	35	120	15, p. m.	30	99	1,720	3.0	574	23.9
IV	14, a. m.	50	85	18, p. m.	46	60	2,080	4.5	461	19.2
V	16, a. m.	53	115	20, a. m.	32	96	1,900	4.0	475	19.8
VI	23, a. m.	54	108	26, p. m.	31	89	2,880	3.5	823	34.3
VII	26, p. m.	48	80	31, a. m.	37	80	1,830	4.5	407	17.0
VIII	29, a. m.	52	119	31, p. m.	48	74	1,960	2.5	785	32.7
Total (omitting Ia)							18,390	32.5	4,754	
Mean of 8 tracks									594	24.8
Mean of 32.5 days									566	23.6
Low areas.										
I	1, a. m.	48	127	5, a. m.	51	69	2,870	4.0	717	29.9
II	3, a. m.	50	124	7, a. m.	46	50	3,170	4.0	794	33.1
III	7, a. m.	55	115	10, p. m.	52	74	2,110	3.5	602	25.1
IV	8, a. m.	50	96	10, a. m.	47	54	2,330	2.0	1,164	48.5
V	9, p. m.	52	123	11, p. m.	46	86	1,780	2.0	890	37.1
VI	11, p. m.	53	103	14, p. m.	46	57	2,330	3.0	776	32.3
VII	11, p. m.	49	127	14, p. m.	50	100	1,280	3.0	426	17.7
VIII	13, a. m.	34	96	18, a. m.	48	55	2,650	5.0	530	22.1
IX	14, a. m.	46	127	19, p. m.	48	60	4,240	5.5	771	32.1
X	19, p. m.	50	116	23, a. m.	40	72	2,710	3.5	773	32.2
XI	24, a. m.	51	110	26, p. m.	49	56	2,570	2.5	1,030	42.9
XII	26, a. m.	47	126	31, a. m.	44	59	3,490	5.0	698	29.1
Total							31,530	43.0	9,171	
Mean of 12 tracks									764	31.8
Mean of 43 days									733	30.5

* Not included in averages.

HIGHS.

Nos. I, V, VI, and VIII were first noted to the north of Montana. Nos. II and III came in from off the central Pacific Coast, and Nos. IV and VII were first noted near Lake Superior. The paths are well distributed over the country. When No. I reached Virginia on the p. m. of the 3d it seems to have divided, a part going northeast to Nova Scotia, and another part hovering over Virginia and North Carolina; there was practically no motion in this offshoot, No. I*a*, and it has not been included in the general summary for the month. These high areas were unaccompanied by any severe cold waves, though there was a fall of 24° to 28° over a limited area in northern Louisiana and northeast Texas when high area No. VI had reached Illinois on p. m. of the 24th. The absence of marked changes in temperature in the northwest was remarkable, as will be noted in another place.

LOWS.

Most of the lows in December were first noted off the north Pacific Coast or to the north of the State of Washington. The tracks are seen to be parallel and are located mostly along the northern border of the country, disappearing finally in the Gulf of St. Lawrence or off Nova Scotia. The month opened with a disturbance in the south-central Gulf of Mexico. The depression was very slight, and, though it crossed the middle of Florida on the a. m. of the 2d, its track was too ill defined and too short to be charted.

On the 2d the disturbance from the Gulf had moved to the Georgia coast, and caused a gale of 40 miles per hour at Charleston and of 50 miles at Hatteras.

As storm No. IV approached the Atlantic Coast it increased rapidly in energy. On the 9th, p. m., the pressure was 29.16 at Eastport, with winds west 52 miles at New York and southwest 48 miles at Woods Hole. The next morning, 10th, a. m., St. Johns, N. F., reported pressure 28.60 and wind north 40 miles per hour; p. m. of 9th Halifax reported rain 1.48 inch, and Sidney 1.04 in twelve hours; a. m. of 10th St. Johns reported 1.14 inch in twelve hours.

No. VIII began in northeast Texas on the a. m. of the 13th; its motion was east and northeast, most of the time beyond Weather Bureau stations. It was last noted, a. m. of the 18th, over Newfoundland.

As storm No. VIII was passing up the Atlantic Coast the severest winds of the month were experienced. On the 16th, p. m., the wind reached 62 miles per hour for five minutes at Nantucket, with an extreme velocity of 105 miles for one minute. At Greenwich, noon (7 a. m.), 16th, the storm is located by the Hydrographic Office about 380 miles southeast of New York City. The highest 5-minute velocity of the month, 80 miles per hour, was noted at Block Island p. m. of the 16th.

When the last low area of the month was passing into the Gulf of St. Lawrence the last high area had reached the region to the north of Lake Superior. The barometric gradients caused by this combination gave a maximum wind velocity at Sault Ste. Marie of 44 miles per hour, which was the highest December velocity, excepting 50 miles in 1890, experienced at this station.

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

December, 1896, was on the whole a pleasant, sunshiny month. In a few localities severe and unseasonable weather prevailed for a short time, a notable exception being the severe snowstorm that covered Virginia, North and South Carolina, and Georgia on the 2d. Rain on the night of the 1st turned to sleet, and later to snow. As a result the trees, telegraph and telephone poles throughout South Carolina and Georgia were so heavily coated with ice that they broke under the great weight. Telegraphic communication with the outside world was interrupted for more than twenty-four hours over a considerable portion of Georgia and South Carolina. Electric light and fire alarm systems were also completely disabled.

The Atlantic Coast storm of the 17th was attended by high winds and snow on the New Jersey and New England coasts. Steamship traffic was delayed and railroad and street car lines were crippled throughout New England. The three-masted schooner *Ulrica* was wrecked on Nantasket Beach. Three persons were frozen to death in New York.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table II, for voluntary observers. Both the mean temperatures and the departures from the normal are given in Table I for the regular stations of the Weather Bureau.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean temperatures* were: In the United States, Key West, 70.3; Jupiter, 66.0; Los Angeles, 59.0; Yuma, 58.6; Port Eads, 57.7; Corpus Christi, 57.6. The lowest were: Moorhead, 14.6; Northfield, 17.9; Bismarck, 19.0; Williston, 19.6. In Canada the highest were: Esquimault, 42.6; Spences Bridge, 34.4; Yarmouth, 28.8. The lowest were: White River, 6.0; Battleford, 7.1; Prince Albert, 8.8.

As compared with the normal for December the mean temperature for the current month was in excess from the Appalachian range and west Gulf stations westward to the Pacific. It was deficient from southern Louisiana and Florida northeastward to Newfoundland. The greatest excesses were: Havre, 12.3; Swift Current and Helena, 12.2; Miles City, 12.1; Calgary, 11.9; Medicine Hat, 11.8. The largest deficits were: St. Johns, N. F., 5.4; Eastport, 4.9; Chatham and Columbia, S. C., 4.5; Albany and Augusta, 4.1; Northfield and New York, 3.7.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: North Dakota, 5.0; Missouri Valley, 6.1; northern Slope, 9.2; middle Slope, 6.2. The greatest negative departures were: New England, 2.8; middle Atlantic, 2.2; south Atlantic, 3.1.

The *years of highest and lowest mean temperatures* for December are shown in Table I of the REVIEW for December, 1894. The mean temperature for the current month was the highest on record at the following stations: Sacramento, 49.4; Fresno, 49.3; Port Angeles, 42.6; Rapid City, 37.8; Helena, 35.9; Baker City, 34.8; Miles City, 31.4. The mean temperature was the lowest on record at: Columbia, S. C., 44.0.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: 84, Los Angeles (3d); 83, Key West and Jupiter (9th), San Antonio (13th); 80, Tampa (8th), Corpus Christi (14th), Palestine (23d); 79, Shreveport (23d); 78, New Orleans (14th), Yuma (3d), San Diego (frequently). The lowest maxima were: 41, Moorhead (frequently), Sault Ste. Marie (11th), Idaho Falls (24th); 44, Huron (9th); 45, St. Paul (28th); 46, Duluth (10th), Bismarck (11th). The highest minima were: 58, Key West (17th); 46, San Diego (18th); 45, Point Reyes Light (7th); 44, Jupiter (23d). The lowest minima were: —27, Moorhead (1st); —26, Williston (2d); —23, Bismarck (2d); —22, Havre (2d); —21, Duluth (1st); —11, Huron and Miles City (2d); —10, Northfield (28th).

The *limits of minimum temperatures*, 32° and 40°, are shown by lines on Chart No. V.

The *years of highest maximum and lowest minimum temperatures* are given in the four last columns of Table I of the current REVIEW. During the present month the maximum temperatures were the highest on record at: Oklahoma, 75; Pueblo, 74. The minimum temperatures were not the lowest on record at any regular station of the Weather Bureau.

The *greatest daily range of temperature and the data for computing the extreme and mean monthly ranges* are given for each of the regular Weather Bureau stations in Table I. The largest values of the greatest daily ranges were: Pueblo, 50; Dodge City, Columbia, Mo., and Carson City, 43; Havre and El Paso, 42; San Luis Obispo and Fort Smith, 41; Hannibal, 40. The smallest values were: Pysht, 10; Tatoosh Island and Fort Canby, 11; Key West, 13; Pysht and Seattle, 16; Astoria and San Francisco, 17.

Among the *extreme monthly ranges* the largest were: Havre, 81; Rapid City, 73; Williston, 72; Bismarck, 69; Moorhead, 68; Duluth, 67; Miles City, 66; Pueblo, 64; Pierre and Sioux City, 63. The smallest were: Tatoosh Island, 17; Fort Canby, 21; Point Reyes Light and San Francisco, 22; Pysht, 24; Port Angeles, and Key West, 25.

The *accumulated monthly departures* from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures. Total.	Accumulated departures. Average.	Districts.	Accumulated departures. Total.	Accumulated departures. Average.
	°	°		°	°
Middle Atlantic	+ 3.7	+ 0.3	New England	— 1.1	— 0.1
South Atlantic	+ 5.6	+ 0.5	Florida Peninsula	— 9.2	— 0.8
East Gulf	+ 4.3	+ 0.4	North Dakota	—11.5	— 1.0
West Gulf	+14.5	+ 1.2	North Pacific	— 1.8	— 0.2
Ohio Valley and Tenn	+12.3	+ 1.0			
Lower Lake	+ 7.5	+ 0.6			
Upper Lake	+18.6	+ 1.6			
Upper Mississippi Valley	+16.9	+ 1.4			
Missouri Valley	+14.1	+ 1.2			
Northern Slope	+ 2.4	+ 0.2			
Middle Slope	+24.8	+ 2.1			
Abilene (southern Slope)	+26.3	+ 2.2			
Southern Plateau	+10.6	+ 0.9			
Middle Plateau	+ 5.0	+ 0.4			
Northern Plateau	+15.0	+ 1.2			
Middle Pacific	+ 0.6	+ 0.0			
South Pacific	+ 6.0	+ 0.5			

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-point for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, is given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer; an evaporometer may be so constructed as to give the *quantity* of water evaporated from a similar surface during any interval of time. Such an evaporometer, therefore, would sum up or integrate the effects of those influences that determine the temperature as given by the wet bulb; from this quantity the *average humidity of the air* during any given interval of time may be deduced.

Measurements of evaporation within the thermometer shelters are difficult to make so as to be intercomparable at temperatures above and below freezing, and they may be replaced by computations based on the wet-bulb temperatures. The absolute amounts of evaporation from natural surfaces not protected from wind, rain, sunshine, and radiation are

being measured at a few experimental stations and will be discussed in special contributions.

Sensible temperatures.—The sensation of temperature experienced by the human body and ordinarily attributed to the condition of the atmosphere depends not merely on the temperature of the air, but also on its dryness, on the velocity of the wind, and on the suddenness of atmospheric changes, all combined with the physiological condition of the observer. A satisfactory expression for the relation between atmospheric conditions and nervous sensations has not yet been obtained.

PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month (from 9 to 30 inches) was heavy on the coasts of Washington, Oregon, and northern California; it was quite light over the rest of the United States, but was rather heavy (7.7) at St. Johns, N. F. The larger values at regular stations were: Pysht, 25.3; Tatoosh Island, 19.9; Astoria, 19.1; Fort Canby, 16.0.

Details as to *excessive precipitation* are given in Tables XII and XIII.

The *years of greatest and least precipitation* for December are given in the REVIEW for December, 1890. The precipitation for the current month was the greatest on record only at Astoria, 19.14. It was the least on record at: Lander, T.; Bismarck, 0.03; Miles City, 0.09; Lynchburg, 0.13; Chicago, 0.16; Fort Smith, 0.33; Baltimore, 0.37; Harrisburg, 0.40; Springfield, Mo., 0.79; Northfield, 0.81; Buffalo, 0.84; Sault Ste. Marie, and Knoxville, 0.95; Parkersburg and Narragansett Pier, 1.56.

The *diurnal variation*, as shown by tables of hourly means of the total precipitation, deduced from self-registering gauges kept at the regular stations of the Weather Bureau, is not now tabulated.

The *current departures* from the normal precipitation are given in Table I, which shows that precipitation was in excess in small portions of the South Atlantic and Florida coasts, northwestern Texas, southern Arizona and California, northern California and Washington. It was deficient over the greater part of the country, and especially in the central Gulf, Middle Atlantic and New England States.

The large excesses were: Astoria, 8.1; Fort Canby, 6.1; Tatoosh Island, 5.4; Savannah, 3.6. The large deficits were: Shreveport, 3.9; Little Rock, 3.8; Chattanooga, 3.7; Vicksburg and Memphis, 3.6.

The *average departure* for each district is given in Table I. By dividing each current precipitation by its respective normal the following corresponding percentages are obtained (precipitation is in excess when the percentage of the normal exceeds 100):

Above the normal: South Atlantic, 109; southern Slope (Abilene), 248; north Pacific, 134.

Normal: Northern Plateau, 100.

Below the normal: New England, 61; Middle Atlantic, 35; Florida Peninsula, 96; east Gulf, 54; west Gulf, 33; Ohio Valley and Tennessee, 40; lower Lake, 64; upper Lake, 42; North Dakota, 43; upper Mississippi, 36; Missouri Valley, 40; northern Slope, 22; middle Slope, 59; southern Plateau, 73; middle Plateau, 36; middle Pacific, 95; south Pacific, 69.

The *total accumulated monthly departures* from normal precipitation from January 1 to the end of the current month are given in the second column of the following table; the third column gives the percentage of the current accumulated precipitation relative to its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	Inches.	*Per ct.*		*Inches.*	*Per ct.*
North Dakota	+2.90	115	New England	−5.00	89
Upper Mississippi Valley	+0.40	101	Middle Atlantic	−7.20	84
Missouri Valley	+0.20	101	South Atlantic	−10.70	80
Northern Slope	+0.90	106	Florida Peninsula	−4.00	92
Middle Slope	+1.80	109	East Gulf	−9.00	84
Abilene (southern Slope)	+2.30	112	West Gulf	−12.50	71
Southern Plateau	+1.10	113	Ohio Valley and Tenn	−4.60	90
Middle Plateau	+2.40	120	Lower Lake	−2.10	94
Northern Plateau	+1.10	106	Upper Lake	−2.40	93
North Pacific	+10.10	117	South Pacific	−1.80	85
Middle Pacific	+3.90	113			

SNOWFALL.

The *total monthly snowfall* at each station is given in Table II; its geographical distribution is shown on Chart V. This chart also shows the isotherms of minimum 32° and of minimum 40° for the air within the ordinary thermometer shelter. The former isotherm is an approximate limit to possible snow, while the latter is an approximate southern limit to the regions that report frost in exposed localities.

Snowfalls of from 5 to 20 inches are reported from the Lake Region and New England; 5 to 15 inches in the interior of the South Atlantic States, which was quite phenomenal and did much damage by the breaking of trees and telegraph lines; snowfalls of 10 to 40 inches were reported from the Sierra Nevada, but only from 5 to 15 from the Rocky Mountain region. A maximum snowfall of 64 inches was reported from Cascade Tunnel, Wash.

The *depth of snow on the ground* at the end of the month is given in detail in Table II, and for the winter months is also shown on Chart VI; it is also shown on the weekly charts of the Climate and Crop Service, published by the Weather Bureau during December to March, inclusive.

In general, at the close of the month, there was about 10 inches of snow on the ground in eastern Connecticut and southeastern Massachusetts, whence it diminished to a "trace" in central Pennsylvania and New York and southern Maine, New Hampshire, and Vermont. There was also about 10 inches in the northern peninsula of Michigan and 10 or 15 in central Minnesota and eastern portions of North and South Dakota; from 10 to 20 inches were reported at mountain stations in Colorado and 10 to 40 at stations in the Sierra Nevada.

ICE.

The thickness of ice in the rivers and harbors is shown in detail in the bulletins published every Monday by the Weather Bureau, the more prominent characteristic data for the beginning and end of the month are as follows: Iowa, Sioux City, 8 and 6 inches. Maine, Eastport, 3.5 and 12; Lewiston, 1.5 and 12.0. Minnesota, Moorhead, 15 and 19.5; St. Paul, 10 and 13. Nebraska, Valentine, 14 and 14.0. North Dakota, Bismarck, 8.5 and 21; Williston, 16 and 16.0. South Dakota, Yankton, 12 and 12.0. Wisconsin, Green Bay, 4.5 and 5.0. At the close of the month the Missouri and upper Mississippi were not frozen so far south as on the corresponding date of 1895, but the ice was thicker at some of the more northerly stations. During the middle and close of the month considerable ice existed in the rivers of New England and New York.

Snow and ice in Canada.—On the December Weather Map of the Canadian Service, Mr. R. F. Stupart says:

On Vancouver Island and in British Columbia the rainfall, as in November, has again been very much above the average generally. At Esquimault 10.4 inches fell, which is 3.0 inches above the average. Agassiz recorded 10.0 inches. In the Northwest Territories and Manitoba, where the precipitation was almost entirely if not altogether in the form of snow, the amount was small and in most localities below average. The Lake Superior district shows a marked deficiency in pre-

cipitation, and this deficit is pronounced throughout Ontario, Quebec and the Maritime Provinces, where the total fall for the month was in many places a half or even less than a half of the average amount.

With reference to the quantity of snow and ice on the ground at the end of the month, Mr. Stupart says:

Snow has almost entirely disappeared from low levels in British Columbia, and the general weather is reported as spring-like. In the Northwest Territories, Edmonton reports 16 inches of snow on the ground, Battleford 12 inches, and Prince Albert 5 inches, while Medicine Hat and Swift Current only record a "trace." Ice appears to be from 10 to 18 inches in thickness. In Manitoba, Minnedosa records 12 inches of snow on the ground, and Winnipeg 3 inches, but this amount was materially increased during the heavy snowfall of the 1st of January. In northern Ontario and in Quebec a few inches of snow covered the ground at the end of the month, but this disappeared during the first few days of January owing to the mild weather and heavy rains, and what little ice there is left on the rivers and lakes is very thin.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 1, 2, 19, 20. Colorado, 13, 24. Connecticut, 11, 15, 16. Delaware, 15, 16, 18. District of Columbia, 15, 18. Georgia, 1, 2, 18. Idaho, 2, 4, 5, 12, 26, 27, 30. Illinois, 6, 17, 25. Indiana, 14, 15, 17, 20, 22. Iowa, 5, 6, 8. Kansas, 7, 20, 21, 26. Kentucky, 15. Louisiana, 1, 2, 20. Maine, 4, 6, 9. Maryland, 15, 18, 23, 30. Massachusetts, 31. Michigan, 4 to 10, 17, 18, 31. Minnesota, 4, 5, 6, 9, 12, 14, 15, 17, 28, 31. Mississippi, 1, 2. Missouri, 8, 13, 17, 18, 19, 23. Montana, 11, 29, 30. Nebraska, 6, 14, 15, 27. Nevada, 5, 12, 25, 27, 29, 30, 31. New Hampshire, 8, 9, 10. New Jersey, 15. New Mexico, 29. New York, 6, 9, 10, 15. North Carolina, 1, 2, 3. North Dakota, 4, 12, 14, 16, 23, 31. Ohio, 4, 14, 15, 16. Oregon, 1, 12. Pennsylvania, 15. South Carolina, 1, 2, 3. South Dakota, 4, 5, 13, 14, 16, 19. Tennessee, 14, 18. Texas, 1. Utah, 13, 29. Vermont, 7, 10. Virginia, 8, 15 to 18. Washington, 1, 2, 4, 7, 9 to 14, 19, 29, 31. West Virginia, 15. Wisconsin, 4, 5, 8, 17.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 14, 15. New Mexico, 29, 30. Oregon, 30, 31. Tennessee, 14. Texas, 31.

WIND.

The *prevailing winds* for December, 1896, viz, those that were recorded most frequently, are shown in Table I for the regular Weather Bureau stations.

HIGH WINDS.

Maximum wind velocities of 50 miles or more per hour were reported during this month at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes; extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				*Miles*	
Block Island, R. I	15	72	ne.	Helena, Mont	4	50	sw.
Do	16	80	ne.	Kittyhawk, N. C	15	54	n.
Do	17	54	ne.	Do	16	56	n.
Do	23	59	ne.	Nantucket, Mass	15	52	ne.
Buffalo, N. Y	9	56	w.	Do	16	62	ne.
Cheyenne, Wyo	4	56	nw.	Do	17	55	ne.
Eastport, Me	16	56	ne.	New York, N. Y	9	52	sw.
El Paso, Tex	16	58	nw.	Do	16	54	n.
Fort Canby, Wash	3	59	s.	Do	19	51	nw.
Do	6	58	s.	Tatoosh Island, Wash	3	50	s.
Do	7	58	s.	Do	6	50	s.
Do	9	60	s.	Do	9	54	s.
Do	10	58	s.	Do	13	52	w.
Do	12	72	s.	Do	26	50	ne.
Do	18	52	s.	Woods Hole, Mass	16	54	ne.
Do	29	78	se.	Do	17	50	n.
Hatteras, N. C	2	51	n.	Do	23	52	n.
Do	15	61	nw.	Do	24	50	n.
Do	16	54	nw.				

The *resultant winds*, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table IX. These latter resultants are also shown graphically on Chart IV, where the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a uniform wind of average velocity. These figures indicate the relative extent to which winds from different directions counterbalanced each other.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 19 regular stations of the Weather Bureau by its photographic, and at 32 by its thermal effects. At one of these stations records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table XI for each hour of local mean time.

Photographic and thermometric registers give the duration of that intensity of sunshine which suffices to make a record, and, therefore, they generally fail to record for a short time after sunrise and before sunset, because, even in a cloudless sky, the solar rays are then too feeble to affect the self-registers. If, therefore, such records are to be used for determining the amount of cloudiness, they must be supplemented by special observations of the sky near the sun at these times. The duration of clear sky thus specially determined constitutes the so-called twilight correction (more properly a low-sun correction), and when this has been applied, as has been done in preparing Table XI, there results a complete record of the clearness of the sky from sunrise to sunset in the neighborhood of the sun. The twilight correction is not needed when the self-registers are used for ascertaining the duration of a special intensity of sunshine, but is necessary when the duration of cloudiness is alone desired, as is usually the case.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table XI.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the duration relative to possible sunshine is derived; the observers' personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for December, 1896, is 6 per cent for photographic and 6 per cent for thermometric records.

The details are shown in the following table, in which the stations are arranged according to the *total possible* duration of sunshine, and not according to the *observed* duration as in previous years.

Difference between instrumental and personal observations of sunshine.

Stations.	Apparatus.	Total possible duration for the whole month.	Personal estimated area of clear sky.	Instrumental record of sunshine. Photographic.	Difference.	Thermometric.	Difference.
		H'rs.	%	%	%	%	%
Tampa, Fla	T.	322.9	55			55	0
Galveston, Tex	P.	320.2	61	64	+ 3		
New Orleans, La	T.	317.8	47			50	+ 3
Savannah, Ga	P.	313.0	63	60	− 3		
Vicksburg, Miss	T.	313.0	61			74	+13
Phœnix, Ariz	P.	310.7	73	79	+ 6		
San Diego, Cal	P.	310.7	66	78	+12		
Atlanta, Ga	T.	307.7	59			57	− 2
Los Angeles, Cal	P.	307.7	65	72	+ 7		
Wilmington, N. C	T.	307.7	57			62	+ 5
Chattanooga, Tenn	T.	305.2	51			46	− 5
Little Rock, Ark	T.	305.2	56			74	+18
Raleigh, N. C	T.	302.5	55			64	+ 9
Santa Fe, N. Mex	P.	302.5	64	75	+11		
Fresno, Cal	T.	299.4	47			50	+ 3
Dodge City, Kans	P.	296.7	62	66	+ 4		
Louisville, Ky	T.	296.7	41			56	+15
San Francisco, Cal	T.	296.7	38			45	+ 7
Baltimore, Md	T.	293.7	34			37	+ 3
Cincinnati, Ohio	T.	293.7	42			38	− 4
Kansas City, Mo	P.	293.7	51	48	− 3		
St. Louis, Mo	T.	293.7	42			57	+15
Washington, D. C	P.	293.7	53	61	+ 8		
Columbus, Ohio	T.	291.7	30			23	− 7
Denver, Colo	P.	291.7	50	69	+19		
Indianapolis, Ind	T.	291.7	36			53	+17
Philadelphia, Pa	T.	291.7	53			70	+17
Cheyenne, Wyo	P.	287.8	47	60	+13		
Eureka, Cal	P.	287.8	35	28	− 7		
New York, N. Y	T.	287.8	51			65	+14
Omaha, Nebr	P.	287.8	45				
Salt Lake City, Utah	P.	287.8	27	51	+24		
Binghamton, N. Y	T.	284.7	26			29	+ 3
Boston, Mass	T.	284.7	50			64	−14
Chicago, Ill	T.	284.7	28			28	0
Cleveland, Ohio	T.	284.7	22				
Des Moines, Iowa	T.	284.7	45			48	+ 3
Detroit, Mich	T.	284.7	27			34	+ 7
Dubuque, Iowa	T.	284.7	26			25	− 1
Albany, N. Y	T.	281.0	37			59	+22
Buffalo, N. Y	T.	281.0	15			16	+ 1
Rochester, N. Y	T.	281.0	19			21	+ 2
Northfield, Vt	P.	277.7	38	41	+ 3		
Portland, Me	T.	277.7	48			62	+14
Eastport, Me	P.	274.3	42	53	+11		
Minneapolis, Minn	T.	274.3				26	
Portland, Oreg.*	T.	269.6	21			13	− 8
	P.	269.6	21	10	−11		
Bismarck, N. Dak	P.	265.6	45	47	+ 2		
Helena, Mont	P.	265.6	35	39	+ 4		
Seattle, Wash	T.	262.1	16			13	− 3

Owing to an inexplicable accident the table of differences, published on page 110 of the REVIEW for April, was seriously disarranged, and the reader is requested to substitute the following in its place:

Difference between instrumental and personal observations of sunshine.

Stations.	Apparatus.	Total possible duration for the whole month.	Personal estimated area of clear sky.	Instrumental record of sunshine. Photographic.	Difference.	Thermometric.	Difference.
		Hours.	%	%	%	%	%
Bismarck, N. Dak	P.	408.4	38	42	+ 4		
Helena, Mont	P.	408.4	52	54	+ 2		
Portland, Oreg.*	T.	407.0	37			30	− 7
	P.	407.0	37	30	− 7		
Eastport, Me	P.	405.2	44	54	+10		
Northfield, Vt	P.	403.6	45	54	+ 9		
Portland, Me	T.	403.6	40			59	+19
Rochester, N. Y	T.	402.1	55			68	+13
Buffalo, N. Y. †	T.	402.1	37			51	+14
Boston, Mass	T.	401.1	53			61	+ 8
Chicago, Ill	T.	401.1	54			63	+ 9
Cleveland, Ohio	P.	401.1	43	57	+14		
Des Moines, Iowa	T.	401.1	39			65	+26
Detroit, Mich	T.	401.1	52			62	+10
Eureka, Cal	P.	399.4	34	38	+ 4		
New York, N. Y	T.	399.4	49			57	+ 8
Salt Lake City, Utah	P.	399.4	28	56	+28		
Columbus, Ohio	T.	398.6	45		*	62	+17
Denver, Colo	P.	398.6	56	76	+20		
Philadelphia, Pa	T.	398.6	47			71	+24
Baltimore, Md	T.	397.0	46			47	+ 1
Cincinnati, Ohio	T.	397.0	56			79	+23
Kansas City, Mo	P.	397.0	45	50	+ 5		
St. Louis, Mo	T.	397.0	53			72	+19
Washington, D. C	P.	397.0	59	55	− 4		
Dodge City, Kans	P.	396.2	60	68	+ 8		
Louisville, Ky	T.	396.2	55			81	+26
San Francisco, Cal	T.	396.2	44			62	+18
Santa Fe, N. Mex	P.	393.6	68	84	+16		
Little Rock, Ark	T.	392.7	37			73	+36
Atlanta, Ga	T.	391.6	59			79	+20
Wilmington, N. C	T.	391.6	69			83	+14
San Diego, Cal	P.	390.5	78	84	+ 6		
Phœnix, Ariz	P.	390.5	80	91	+11		
Savannah, Ga	P.	389.9	59	72	+13		
Vicksburg, Miss	T.	389.9	67			67	0
New Orleans, La	T.	387.4	48			50	+ 2
Galveston, Tex	P.	386.4	35	44	+ 9		

*Records by both methods.

†Instrumental records for only twenty-one days, for which the total possible was 285.9.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table X, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which reports of thunderstorms for the whole country were most numerous were: 14th, 49; 30th, 39.

Thunderstorm reports were most numerous in: Louisiana, 17; New Mexico, 13; Tennessee, 14.

Thunderstorms were most frequent in: Idaho and Texas, 4 days; Louisiana, 7.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 15th to the 23d, inclusive. On the remaining twenty-two days of this month 277 reports were received, or an average of about 13 per day. The dates on which the number of reports especially exceeded this average were: 3d, 183; 4th, 23.

Auroras were reported most frequently in: Michigan, 7 days; Montana, 9; New York, 8; Ohio, 11.

The number of reports was a large percentage of the number of observers in: Maryland, 45; North Dakota, 36; Massachusetts, 32; New York, 30; Nebraska, 22.

CANADIAN REPORTS.

A thunderstorm was reported at Edmonton on the 21st.

Auroras were reported as follows: Halifax, 27th; Grand Manan, 3d; Yarmouth, 3d; St. Andrews, 4th; Charlottetown, 3d; Father Point, 5th; Quebec, 1st; Montreal, 3d; Toronto, 3d; White River, 3d, 13th; Ottawa, 3d; Port Stanley, 13th; Winnipeg, 27th; Minnedosa, 1st, 3d, 6th to 9th; Medicine Hat, 11th, 12th; Calgary, 4th, 5th; Prince Albert, 5th, 12th; Battleford, 13th, 14th.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 46.4°, or 0.2° below normal; the highest was 83°, at Healing Springs on the 9th, and the lowest, 12°, at Oneonto on the 25th. The average precipitation was 1.60, or 2.89 below normal; the greatest monthly amount, 4.77, occurred at Healing Springs, and the least, 0.35, at Livingston. The month was generally favorable for all farming operations, and at the close of the month considerable land was prepared for the coming crop, and work on truck farms in the southern counties was well up. There is some complaint of scarcity of water in the north-central portions, but this, however, is of a local character. The rivers were in good navigable condition during the first half of the month, but were barely navigable toward the close.—*F. P. Chaffee.*

Arizona.—The mean temperature was 50.0°, or 3.0° below normal; the highest was 90°, at Tucson on the 23d, and the lowest, 10°, at Fort Apache on the 10th and 11th. The average precipitation was 0.67, or 0.31 above normal; the greatest monthly amount, 1.71, occurred at Signal, while none fell at Russellville.—*W. T. Blythe.*

Arkansas.—The mean temperature was 45.8°, or 2.3° above normal; the highest was 81°, at Texarkana on the 10th, and the lowest, 8°, at Keesees Ferry on the 1st. The average precipitation was 0.84, or 3.81 below normal; the greatest monthly amount, 2.75, occurred at Warren, and the least, 0.15, at Lacrosse.—*F. H. Clarke.*

California.—The mean temperature was 50.1°, or 2.8° below normal; the highest was 92°, at Downey and Pomona on the 3d, and the lowest, 1°, at Bodie on the 31st. The average precipitation was 3.47, or 0.94 below normal; the greatest monthly amount, 17.23, occurred at Delta, while none fell at Beaumont, Indio, Mammoth Tank, and Palm Springs.—*J. A. Barwick.*

Colorado.—The mean temperature was 29.7°, or 3.7° above normal; the highest was 74°, at Pueblo on the 22d, and the lowest, 20° below zero, at Gunnison on the 22d. The average precipitation was 0.59, or about one-half the normal; the greatest monthly amount, 4.95, occurred at Santa Clara, while none fell at St. Cloud.—*F. H. Brandenburg.*

Florida.—The mean temperature was 57.9°, or 3.6° below normal; the highest was 86°, at Lemon City on the 9th and 10th, and the lowest, 26°, at De Funiak Springs on the 25th. The average precipitation was 2.14, or 0.67 below normal; the greatest monthly amount, 5.70, occurred at Tallahassee, and the least, 0.50, at Oxford. The month presents no marked departures from normal conditions. It was favorable for farm work, and winter truck interests made good progress. Some growers banked with dirt for the winter. Only over northern districts were frosts of sufficient severity to cause apprehension. During the latter part of the third decade frost was observed over the northern portion of the north-central district; no serious damage resulted.—*A. J. Mitchell.*

Georgia.—The mean temperature was 46.0°, or 1.0° below normal; the highest was 81°, at Hawkinsville on the 1st and 2d, and the lowest, 9°, at Clayton, on the 26th. The average precipitation was 3.36, or 0.88 below normal; the greatest monthly amount, 7.62, occurred at Fleming, and the least, 0.33, at Ramsey.

Idaho.—The mean temperature was 31.0°; the highest was 63°, at Mindoka on the 13th, and the lowest, 10° below zero, at Roseberry on the 21st. The average precipitation was 1.75; the greatest monthly amount 4.94, occurred at Fort Sherman, and the least, 0.20, at Martin.—*D. P. McCallum.*

Illinois.—The mean temperature was 34.7°, or 5.0° above normal; the highest was 70°, at Cairo on the 12th, and the lowest, 4° below zero, at Scales Mound on the 19th. The average precipitation was 0.53 or 1.92 below normal; the greatest monthly amount, 1.41, occurred at Martinsville, and the least, "trace," at Minonk.—*C. E. Linney.*

Indiana.—The mean temperature was 35.2°, or 1.9°, above normal; the highest was 68°, at Evansville on the 12th, and the lowest, 9° below zero, at Auburn on the 24th. The average precipitation was 1.29, or 1.51 below normal; the greatest monthly amount, 2.21, occurred at Jeffersonville, and the least, 0.37 at South Bend.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 30.8°, or 7.0° above normal; the highest was 70°, at Belknap on the 5th, 8th, and 10th, and the lowest, 10° below zero, at Rock Rapids on the 1st. The average precipitation was 0.65, or 1.00 below normal; the greatest monthly amount, 1.79, occurred at Dows, and the least, "trace," at Denison.—*G. M. Chappel.*

Kansas.—The mean temperature was 39.6°, or 5.0° above normal; the highest was 78°, at Hutchinson on the 22d, and the lowest, 4°, at Phillipsburg and Pratt on the 1st. The average precipitation was 0.44, or 0.44 below normal; the greatest monthly amount, 2.60, occurred at Fort Riley, while none fell at Morland and Norton.—*T. B. Jennings.*

Kentucky.—The mean temperature was 39.6°, or 0.4° above normal; the highest was 73°, at Russellville on the 30th, and the lowest, 7°, at Ashland on the 25th. The average precipitation was 1.82, or 1.68 below normal; the greatest monthly amount, 3.36, occurred at South Fork, and the least, 0.49, at Middlesboro. Taken as a whole December was a fine winter month, the weather being generally fair throughout, and the temperature comparatively mild. The only heavy rainfall occurred about the 8th, but it was sufficient to thoroughly moisten the soil and nurture winter wheat, which was reported to be in excellent condition. The temperature did not continue low enough during the prevalence of the two cold waves, which were central on the 1st and 25th, to freeze the soil except a mere coating at the surface. Hence, wheat did not suffer from any severe cold, even though there was no snow on the ground during these periods of low temperature. Pastures were never better in midwinter, except in December, 1894, and January, 1895.—*Frank Burke.*

Louisiana.—The mean temperature was 51.7°, or 2.2° below normal; the highest was 82°, at Abbeville on the 8th, and the lowest, 16°, at Robeline on the 18th. The average precipitation was 2.09, or 1.44 below normal; the greatest monthly amount, 4.57, occurred at Sugar Experiment Station, Audubon Park, and the least, 0.33, at Calhoun. December, 1896, favored the farmers and planters of Louisiana, the month being dry, permitting the marketing of the several crops harvested, and it was also a particularly favorable month to the sugar planters, giving but little bad weather and no severe cold to injure the cane crop. The grinding season was practically closed before the close of December, although some planters have some cane standing at date, and there is also some in windrow to be ground. These cases are, however, the exception. The severe drought and unusually warm weather during the past season made planters anticipate a rather short sugar yield, but it is gratifying to learn that the State is turning out one of the largest sugar yields ever made in one season. The loss to cane from freezing weather was immaterial, and a considerable amount of windrowing was done as a precautionary measure against severe cold. Some cane has already been planted, and plowing is progressing in various portions of the sugar belt.—*R. E. Kerkam.*

Maryland.—The mean temperature was 34.3°, or 2.0° below normal; the highest was 70°, at Charlotte Hall on the 7th, and the lowest, 2° below zero, at Sunnyside on the 28th. The average precipitation was 0.86, or 1.56 below normal; the greatest monthly amount, 2.71, occurred at Sunnyside, and the least, 0.11, at Johns Hopkins Hospital.—*G. E. Hunt.*

Michigan.—The mean temperature was 26.9°, or 1.4° below normal; the highest was 60°, at Hanover, Clinton, Grape, and Berrien Springs on the 12th, and the lowest, 23° below zero, at Thomaston on the 1st. The average precipitation was 0.95, or 1.61 below normal; the greatest monthly amount, 2.23, occurred at Wetmore, and the least, 0.22, at Stanton. The precipitation is by far the least average total for any December during the past ten years.—*C. F. Schneider.*

Minnesota.—The mean temperature was 20.3°, or 3.2° above normal; the highest was 52°, at Mazeppa on the 12th, and the lowest, 51° below zero, at Pokegama on the 1st. The average precipitation was 0.61, or 0.25 below normal; the greatest monthly amount, 1.79, occurred at Mount Iron, and the least, "trace," at St. Cloud.—*T. S. Outram.*

Mississippi.—The mean temperature was 48.8°, or 1.3° above normal; the highest was 88°, at French Camp on the 8th, and the lowest, 16°, at Austin on the 25th. The average precipitation was 1.29, or 3.84 below normal; the greatest monthly amount, 4.57, occurred at Magnolia, and the least, "trace," at Kosciusko. No precipitation was reported from Hazelhurst and Columbus.—*R. J. Hyatt.*

Missouri.—The mean temperature was 38.7°, or 4.8° above normal; the highest was 79°, at Gorin on the 30th, and the lowest, 5° below zero, at Maryville on the 1st. The average precipitation was 0.94, or 1.06 below normal; the greatest monthly amount, 3.90, occurred at Osceola, and the least, 0.02, at Maryville and St. Joseph. The month was remarkably favorable for outdoor work, and throughout the greater portion of the State plowing could be done on nearly every day, but the deficient precipitation and almost total absence of snow was injurious to winter wheat, which suffered considerably from the severe freeze at the close of November.—*A. E. Hackett.*

Montana.—The mean temperature was 33.0°, or 10.0° above normal; the highest was 75°, at Billings on the 30th, and the lowest, 24° below zero, at Glasgow and Poplar on the 1st. The average precipitation was 0.34, or 0.29 below normal; the greatest monthly amount, 3.49, occurred at Troy; none fell at five stations. The weather during the month was remarkably mild and pleasant, and with the exception of a cold

wave on the 1st and 2d no cold weather occurred, and temperatures below zero after the above dates were almost unknown. The extreme cold weather in November was the cause of much anxiety among the cattle and sheep owners, and the early portion of December showed no signs of improvement, but at the end of the month all stock on the ranges had regained in flesh what they had lost during the cold weather and snows of the previous month. Hunters report that hibernating animals, such as bear, badger, and ground hog have abandoned their winter quarters, and their appearance at this early date is looked upon by old timers as a sure sign that the backbone of winter is broken.—*R. M. Crawford.*

Nebraska.—The mean temperature was 34.0°, or 8.4° above normal; the highest was 70°, at Aurora on the 10th and at Curtis on 22d, and the lowest, 10° below zero, at Hartington on the 1st. The average precipitation was 0.23, or 0.46 below normal; the greatest monthly amount, 0.90, occurred at Rulo, while none fell at several stations. Fog was general and dense on the last three days of the month in the southern and eastern portions of the State. This, with the high temperature, caused the month to close with the frost practically out of the ground in much of the southeastern portion of the State.—*G. A. Loveland.*

Nevada.—The mean temperature was 34.5°, or 4.6° above normal; the highest was 73°, at Candelaria on the 3d, and the lowest, 10° below zero, at Stofiel on the 7th. The average precipitation was 0.40, or 1.01 below normal; the greatest monthly amount, 2.11, occurred at Lewers Ranch; no rain or snow fell at St. Clair, and several stations report only "traces." The month was unusually mild.—*R. F. Young.*

New England.—The mean temperature was 24.6°, the highest was 59°, at Cambridge, Mass., on the 13th, and the lowest, 21° below zero, at Flagstaff, Me., on the 23d. The precipitation was greatly below the normal in all parts of the district, except the southern Massachusetts coast, where the totals varied little from the average; the greatest monthly amount, 3.67, occurred at Long Plain, Mass., and the least, 0.45, at Enosburg Falls, Vt.—*J. W. Smith.*

New Jersey.—The mean temperature was 31.3°, or 1.2° below normal; the highest was 64°, at Moorestown on the 7th and at Barnegat on the 10th, and the lowest, 15° below zero, at River Vale. The average precipitation was 1.43, or 2.20 below normal; the greatest monthly amount, 2.70, occurred at River Vale, and the least, 0.85, at Barnegat. Winter grain and grass were well protected by snow during the severe cold spell, 10th to 29th.—*E. W. McGann.*

New Mexico.—The highest temperature was 76°, at Clayton on the 22d, and the lowest, 1°, at Monero on the 1st and at Buckmans on the 17th. The greatest monthly precipitation was 3.25 at Albert, while none fell at Deming.—*H. B. Hersey.*

New York.—The mean temperature was 26.3°, or 1.9° below normal; the highest was 69°, at Waverly on the 6th, and the lowest, 20° below zero, at North Lok on the 22d, Wappingers Falls on the 25th, and Saranac Lake on the 26th. The average precipitation was 1.36, or 1.49 below normal; the greatest monthly amount, 3.82, occurred at Demster, and the least, 0.35, at Eagle Mills.—*R. M. Hardinge.*

North Carolina.—The mean temperature was 40.6°, or 2.2° below normal; the highest was 73°, at Soapstone Mount on the 10th, and the lowest, 4°, at Highlands on the 25th. The average precipitation was 2.51, or 1.31 below normal; the greatest monthly amount, 5.77, occurred at Beaufort, and the least, 0.58, at Saxon. Excepting the storms on the 2d and 15th, the weather during the month was remarkably pleasant. The snowstorm on the 2d covered the ground to an average depth of five inches.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 16.4°; the highest was 53°, at Oakdale on the 10th and 11th, and the lowest, 35° below zero, at McKinney on the 2d. The average precipitation was 0.37, or 0.33 below below normal; the greatest monthly amount, 1.60, occurred at Sheyenne, and the least "trace," at White Earth.—*B. H. Bronson.*

Ohio.—The mean temperature was 32.9°, or 0.2° above normal; the highest was 67° at Portsmouth on the 12th, and the lowest, 15° below zero, at Benton Ridge on the 24th. The average precipitation was 1.65, or 0.88 below normal; the greatest monthly amount, 3.85, occurred at Rittman, and the least, 0.43, at Frankfort. The alternate freezing and thawing weather and lack of continued snow protection hurt wheat. A fairly good month for prosecution of farm work.—*H. W. Richardson.*

Oklahoma.—The mean temperature was 44.4°, or 5.0° above normal; the highest was 87°, at Fort Reno on the 12th, and the lowest, 8°, at Healdton on the 1st. The average precipitation was 1.24, or 1.20 below normal; the greatest monthly amount, 3.55, occurred at Mangum, while none fell at South McAlister. The month was remarkably mild and pleasant, being the warmest December for which there is a record; not a norther or blizzard occurred. The mean temperature for the year was 61.7°, or 2.7° above the yearly normal. The average precipitation was 24.00, or 9.29 below normal.—*Jas. S. Widmeyer.*

Oregon.—The mean temperature was 42.6°, or 3.9° above normal; the highest was 66°, at Bay City on the 15th, and the lowest, 8°, at Burns on the 21st. The average precipitation was 8.58, or 2.30 above normal; the greatest monthly amount, 30.05, occurred at Glenora, and the least, 0.60, at Burns. Though very rainy, the weather during December was less stormy than usual; there was an almost complete absence of injurious frosts.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 30.6°, or 2.4° below normal; the highest was 67°, at Indiana on the 10th and Cannonsburg and Irwin on the 13th, and the lowest, 13° below zero, at Dyberry on the 28th. The average precipitation was 1.20, or 2.12 below normal; the greatest monthly amount, 2.62, occurred at Somerset, and the least, 0.40, at Harrisburg and Reading.—*T. F. Townsend.*

South Carolina.—The mean temperature was 44.0°, or 4.3° below normal; the highest was 83°, at Trial on the 8th and 11th, and the lowest, 8°, at Santuc on the 5th. The average precipitation was 3.55, or 0.41 above normal; the greatest monthly amount, 6.46, occurred at St. George, and the least, 0.55, at Walhalla. The month began with a sleet storm over the entire State, followed by snow over all but the southeastern third of the State. In the central belt of counties the sleet storm was destructive to trees, telegraph and telephone poles and wires. The weight of the accumulated ice and snow on the branches of trees broke many of them, and even whole trees were broken down by the weight. Telegraphic and telephonic communication was completely interrupted for some time, until repairs could be made. The rainfall averaged 113 per cent of the usual December amount, due to an excess over the coast, or lower counties generally, and a deficiency over the western counties, while over the central counties the rainfall varied little from the normal.—*J. W. Bauer.*

South Dakota.—The mean temperature was 26.0°, or about 5.0° above normal; the highest was 70°, at Rapid City on the 9th, and the lowest, 23° below zero, at Webster on the 1st. The average precipitation was 0.17, or 0.43 below normal; the greatest monthly amount, 0.99, occurred at Webster, while none fell at several stations. The month as a whole was a very pleasant one, comparatively; in point of temperature, was less a winter month than November and was much more pleasant than many other Decembers of which there is reliable record. It was unusually free from disagreeable and stormy weather. Reports from the ranges indicate that there was little or no snow to interfere with the grazing of stock and that all range interests are in good condition.—*S. W. Glenn.*

Tennessee.—The mean temperature was 40.8°, or 0.4° below normal; the highest was 73° at Memphis on the 11th and Waynesboro on the 13th, and the lowest, 6°, at Rugby on the 25th. The average precipitation was 1.36, or 2.27 below normal; the greatest monthly amount, 3.89, occurred at Nunnelly, and the least, 0.22, at Rugby. The month was characterized by large excess of clear weather and less than one-half the usual number of days with .01 or more of an inch of rainfall, and while conditions were highly favorable to agricultural interests they were detrimental to other business and the general health of animal life.—*H. C. Bate.*

Texas.—The mean temperature was 1.5° below normal; there was a general deficiency throughout the State except over the Panhandle, west and central Texas, and the western portion of north Texas, where there was an excess ranging from 1.8° to 7.0°, with the greatest over the Panhandle. The deficiency ranged from normal to 6.3° below over the coast district and southwest Texas, and from 1.5° to 6.8° over the eastern portion of north Texas and over east Texas, with the greatest deficit in the vicinity of Huntsville. The highest was 92°, at Camp Eagle Pass on the 14th, and the lowest, 9°, at Graham on the 1st. The average precipitation was 0.38 below normal. The precipitation was generally in the form of rain, and was not well distributed throughout the State. There was comparatively none during the first and second decades of the month, except scattering showers on the 7th and 8th over the southeastern portion of the State, but general showers, with good local rains, occurred just at the close of the month. On an average the precipitation for the month was above the normal over the Panhandle, the western portion of north Texas, central Texas, and the central portion of the coast district, while there was a general deficiency over the other portions of the State. The greatest monthly amount, 5.67, occurred at Houston, and the least, 0.05, at Sanderson.

The dry weather during the first and second decades of December was exceptionally favorable for farming operations, and much work was done. Toward the close of the month the ground was getting rather dry for winter plowing, and this work was retarded to some extent. The showers with local rains in some sections at the close of the month were generally needed, and were very beneficial for all farming interests. It is reported from north Texas that more plowing is being done than usual, and farm work as a rule is well advanced.

Winter wheat continued to do fairly well during the early part of the month, except that the severe cold weather at the close of November and at the opening of December injured the plant slightly in a few localities. The dry weather was causing the crop to suffer from want of rain, and the showers over the wheat belt at the close of the month were exceptionally beneficial to the crop, and will improve its condition generally. The plant has a healthy appearance, and the prospects for a good crop are promising.

Winter and volunteer oats were damaged slightly by the cold weather, and the crop suffered slightly for want of rain before the showers occurred toward the close of the month; otherwise the crop continues doing well.—*I. M. Cline.*

Utah.—The mean temperature was 31.0°, or about 4.0° above normal; the highest was 66°, at Fillmore on the 27th, and the lowest, 3° below zero, at Koosharen on the 1st. The average precipitation was 0.46, or about one-half the normal; the greatest monthly amount, 1.41, occurred

at Brigham City, and the least, "trace," at Giles and Mammoth. Upon the whole, the weather conditions were exceptionally fine for farm work, but very detrimental to stock interests.—*J. H. Smith.*

Virginia.—The mean temperature was 36.9°, or 3.1° below normal; the highest was 86°, at Stanleyton on the 8th, and the lowest, 2°, at Dale Enterprise. The average precipitation was 1.02, or 2.59 below normal; the greatest monthly amount, 4.04, occurred at Hampton, and the least, "trace," at several stations.—*E. A. Evans.*

Washington.—The mean temperature was 40.0°, or 2.3° above normal; the highest was 65°, at Sedro on the 8th and 9th and Kennewick on the 9th, and the lowest, 5°, at Loomis on the 1st. The average precipitation was 7.97, or 1.37 above normal; the greatest monthly amount, 26.26, occurred at Clearwater, and the least, 1.14, at Moxee.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 35.0°, or about normal; the highest was 67°, at Old Fields on the 13th, and the lowest, 2° below zero, at Marlington on the 25th. The average precipitation was 1.68, or 1.50 below normal; the greatest monthly amount, 2.88, occurred at Beverly, and the least, 0.57, at Romney. Very little snow fell in the Ohio Valley and its larger tributaries. In the mountains the total depth at some stations ranged from 4 to 8 inches. It was generally moist in character and soon disappeared. The weather on the whole was beneficial to the winter wheat, and at the close of the month this crop was in good condition and promising.—*H. L. Ball.*

Wisconsin.—The mean temperature was 28.6°, or 2.0° above normal; the highest was 62°, at Delavan on the 29th, and the lowest, 20° below zero, at Spooner on the 1st. The average precipitation was 0.84; the greatest monthly amount, 2.44, occurred at Hayward, and the least, 0.05, at Chilton.—*W. M. Wilson.*

Wyoming.—The mean temperature was 32.1°; the highest was 70°, at Fort Laramie on the 11th, and the lowest, 13° below zero, at Fort Washakie. The average precipitation was 0.10; the greatest monthly amount, 0.46, occurred at Fort Yellowstone, while none fell at Fort Laramie, Fort Washakie, and Wise.—*M. G. Renoe.*

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

The *extreme and average stages of water* in the rivers for the current month are given in Table VIII. In no case have the rivers reached dangerous heights. At the close of the month navigation on the upper Mississippi and the Missouri was practically suspended. The latter river was frozen north of Sioux City. The Ohio and lower Mississippi were navigable throughout the month. The rivers of the Atlantic Coast and the South have been at low stages.

The following résumé of river stages and conditions of navigation in the various streams is compiled from reports by the following officials of the Weather Bureau at various river stations and section centers:

A. F. Sims, Observer, Albany, N. Y.; E. R. Demain, Observer, Harrisburg, Pa.; E. A. Evans, Local Forecast Official, Richmond, Va.; C. F. von Herrmann, Observer, Raleigh, N. C.; L. N. Jesunofsky, Local Forecast Official, Charleston, S. C.; David Fisher, Observer, Augusta, Ga.; J. B. Marbury, Local Forecast Official, Atlanta, Ga.; W. M. Dudley, Observer, Mobile, Ala.; F. P. Chaffee, Local Forecast Official, Montgomery, Ala.; S. S. Bassler, Local Forecast Official, Cincinnati, Ohio; Frank Ridgway, Local Forecast Official, Pittsburg, Pa.; H. L. Ball, Observer, Parkersburg, W. Va.; L. M. Pindell, Observer, Chattanooga, Tenn.; F. J. Walz, Local Forecast Official, Davenport, Iowa; H. C. Frankenfield, Local Forecast Official, St. Louis, Mo.; S. C. Emery, Observer, Memphis, Tenn.; R. J. Hyatt, Local Forecast Official, Vicksburg, Miss.; R. E. Kerkam, Local Forecast Official, New Orleans, La.; L. A. Welsh, Local Forecast Official, Omaha, Nebr.; Patrick Connor, Local Forecast Official, Kansas City, Mo.; F. H. Clarke, Local Forecast Official, Little Rock, Ark.; W. H. Hammon, Forecast Official, San Francisco, Cal.

Hudson River.—On the 4th much anchor ice formed in the river, but the mild conditions of the 6th caused all the ice to disappear from both river and basin. On the 16th anchor ice again appeared in the river. The prevalent northerly wind kept the water in the Hudson below the normal level and rendered navigation difficult from Van Wies Point to Troy. The People's Line sent their last boat south on the evening of the 16th. The steamer *City of Troy* left for New York City on the 17th, the last south bound boat of the season from the head of tidewater navigation. Half-inch ice covered the Albany basin on the 17th, and had thickened to 3 inches by the 19th. On the morning of the 20th the Hudson River was frozen over from Troy to Hudson, and the icemen took advantage of the situation and began the work of staking out ice claims. The high west and northwest winds filled the ice with dust particles, which will detract somewhat from what would otherwise be considered a perfect ice formation in the Albany district. At the close of the month an average of 4 inches of snow covered the Hudson and Mohawk watersheds; the ice in the Mohawk averaged 13 inches in thickness at Schenectady and that in the Hudson ranged from 7 inches at the State dam to 2 inches at Newberg.

Susquehanna River and branches.—Notwithstanding the fact that the precipitation over the drainage area of the Susquehanna River and its tributaries was very light, probably less than during any December since observations began, the streams maintained about the average stages of water for the time of year. At Harrisburg the river averaged 0.4 of a foot higher than in December, 1895, although the rainfall was only about 12 per cent of the amount reported for December, 1895, being the least (only 0.40 inch) for any December since the Weather Bureau station was opened. On the West Branch and the Juniata the rainfall was heavier, averaging about 1 inch. The West Branch was reported closed at Farrandsville during the entire month. It closed at Renova on the 24th and at Keating on the 25th. The Juniata was closed at Mifflin from the 3d to the 8th and from the 24th to the close of the month. The Susquehanna did not freeze over at Harrisburg, but there was ice along its banks, from the 24th to the 29th, sufficient for skating. It closed between Columbia and Wrightsville, about 60 miles below Harrisburg, on Christmas night, and on December 28 the ice was 5 to 6 inches thick, and persons were able to cross on foot. It was still closed at the end of the month, although probably not safe for crossing at that time on account of the milder weather.

Rivers of the South Atlantic States.—The rainfall in the valley of the James was light, and as a consequence the river remained low. There were no perceptible rises attendant upon any of the rains which fell. In the upper valley there was a steady fall of the river during the entire month, with the exception of the 7th and 29th, when slight rises occurred. The close of the month found the river in its normal condition as to purity and height for the time of year.

The rivers of North Carolina were uniformly low, though somewhat higher than during November. Slightly higher stages prevailed from the 2d to 5th, 8th to 11th, and 17th and 18th, but in no case approached the danger lines. The lowest stages were attained toward the end of the month.

The heavy rainfall in South Carolina on the 1st and 2d was mostly confined to the coast region, and in consequence there were no freshets of marked severity. The rains were followed early on the morning of the 2d at points within 50 miles of the coast by an ice storm covering everything with a coating of ice one-half inch to one and one-quarter inches thick, which prostrated many trees and caused much damage to the telegraph poles and wires. Snowfall measuring 3 to 8 inches occurred over the central portion of the State on the 2d. It melted slowly during the 3d to 6th, and had but little effect upon the streams in that section. Thin and running ice was observed in the Wateree at Camden and in the Great Pee Dee at Cheraw on the 3d to 5th and the 24th to 26th.

The Great Pee Dee was navigable up to Cheraw until the 23d. The Congaree was at a low stage during the last half of the month. Many cotton factories located on the Saluda and Broad rivers were running from the 1st to the 16th; after that date they were shut down again on account of the lack of water. The Waccamaw remained at a navigable stage from Winyah Bay to Waccamaw during the entire month. Navigation was uninterrupted on the Santee and Wateree between St. Stephens and Camden during the month. More merchandise was shipped at Charleston and Georgetown over the various streams than for many months past.

Two rises occurred in the Savannah River during the month, the first culminating on the 3d and the other on the 16th. No better conditions could be desired for navigation than have prevailed, the boats making regular trips with fairly good cargoes, cotton forming the chief commodity now in transportation.

Other Georgia rivers, low at the beginning of the month, continued so to its end. There were no sudden rises and the changes were but slight from day to day.

Mobile River and branches.—The Mobile River and its tributaries have,

with the exception of the first four days of the month, continued unusually low as very little rain has fallen; the boats could go no farther upstream than Demopolis on the Tombigbee the first three weeks of the month, and no higher than Gays Landing during the closing week of the month. The Alabama River was navigable during the first half of the month, but scarcely so during the latter half.

Ohio River and branches.—During the entire year just closed the Ohio has been navigable, and the oldest river men say that they can not remember a year comparable with 1896 for long periods of good stages and freedom from interruption of navigation.

There was a coal-boat stage at Pittsburg during the first two days of December and again from the 10th to the 14th. Smaller packets have been running during the entire month, but there has been scarcely enough water for the large packets since the 26th. Large quantities of ice were running in the Alleghany River on the 4th, 22d, 23d, and 24th.

The month's rainfall, was below the normal. The rainfall of the 8th and 9th occurred chiefly in the upper Ohio Valley and the West Virginia watersheds. Rains during the latter part of November had swelled the Monongahela, and at the opening of December the Ohio below Pittsburg showed an ebbing flood of moderate height. At the same time the Great and Little Kanawhas had good water stages. The Ohio and its northern tributaries began rising on the 9th. During the latter half of the month the rivers fell slowly but not sufficiently low to interfere with navigation except by the largest boats. The river men state that, as regards the stages of water, December was an unusually good month, although business was dull. From the 25th to the 30th the Ohio was running pretty heavily with ice, which caused a temporary tie up on some of the packet lines.

The highest water in the Tennessee occurred at the beginning of the month. The stage at Chattanooga was the highest recorded in the past ten years. There were eighteen more days of navigable water than in 1895. The river was open to navigation by small boats the entire month, but all large boats were tied up on the 28th. The river was practically free from drift during the month, and its general condition has been favorable for those engaged in river traffic and considerable business was done.

Mississippi River and minor branches.—Navigation above Davenport was practically closed during the entire month, and no boats were running with the exception of a few ferryboats. The river was frozen, however, for only a part of the month. It remained open below Dubuque, though the greater part of the time there was a considerable quantity of floating ice. The ice gorge which formed just below Lake Pepin during the latter part of November, remained in the river during the greater part of the month, and with little change as the location and character of the gorge itself was concerned. The water, however, broke passageway under it and the stage declined at Reeds Landing after the 1st. There was a sharp rise in the river at La Crosse the first four days of the month, and at North McGregor from the 5th to the 12th; this rise reached Dubuque between the 8th and the 12th, and carried the ice out in that section.

The river from Davenport to St. Louis was low, but sufficiently high for light traffic. There was, however, little navigation above St. Louis; only a few boats carrying grain made trips from the Illinois River. On this latter river towboats were still running at the end of the month. Ice commenced running past St. Louis on the 2d. The quantity was small, and by the 5th it had disappeared. A second run occurred on the 26th and disappeared by the 29th. From the 19th to the 25th the river from Burlington, Iowa, to Hannibal, Mo., was filled with heavy ice, and on the 27th the ice in Quincy Bay attained a thickness of two inches.

From St. Louis to Cairo there has been little change in the prevailing low water, but south of Cairo there was a marked rise. At Memphis the stage of water increased rapidly from the 1st to the 10th, the increase averaging about one foot for each day, until a stage of 16.6 feet was reached on the 10th, after which it fell gradually to the end of the month, though a good depth of water was maintained at all times. Navigation was not interrupted in any way during the month, either in the Mississippi or its numerous tributaries between Cairo and Memphis, and the conditions upon the whole were unusually favorable for the river men. No ice has yet been seen in this section.

The Mississippi River and its tributaries between Memphis and Vicksburg were low, especially the tributary streams, owing to the unusually small amount of precipitation during the month of December, but they were navigable, except the upper White River, where navigation was suspended.

The Mississippi, south of Vicksburg, showed a marked rise for the season of the year between the 5th and middle of the month, affecting the stage at Vicksburg by a 12-foot rise, but decreasing to a rise of less than three feet at New Orleans. A gradual decline occurred between the 15th and 22d, amounting to about seven feet at Vicksburg, and less than two feet at New Orleans. The fluctuations after the 22d were slight.

The Red River showed mild fluctuations during the first ten days of the month, during which the highest waters occurred; thereafter there was a general and very gradual decline to stages below zero at Shreveport and Alexandria during the latter part of the month. The highest waters in the Ouachita occurred during the early part of the month, Camden and Monroe showing 14-foot stages. There was a general and rapid decline at Camden after the 1st, and at Monroe after the 7th; the month closed with low stages for the season. Navigation was interfered with in the Red and Ouachita rivers during the greater part of the month, the Red River boats running light draft as far north as Coushatta, and no traffic worthy of mention existing on the Ouachita.

Missouri River.—At Omaha the river was practically frozen over until the afternoon of the 9th, when the ice broke up and ran out. Ice was running on the 5th and 6th at St. Joseph, the river becoming clear on the 7th. The river was clear southward from Sioux City at the close of the month. At Kansas City the river was clear of ice from the 8th to the 20th and 27th to 31st, inclusive; during the rest of the month there was more or less floating ice.

Arkansas River.—During the first fourteen days of December a fairly good boating stage prevailed in the upper river between Dardanelle and Little Rock. On December 15 a decline set in and continued to the end of the month, the water during this time being too low for navigation except by the smallest boats. The lower river, south of Little Rock, was navigable during the entire month. The low stage was very favorable for constructing the bridge at Little Rock. At the end of the month the piers were so far advanced that high water could not do damage other than to delay work. No ice has been seen during the month.

Rivers of the Pacific Coast.—The Sacramento River at the beginning of the month was at a stage permitting easy navigation. The river continued nearly stationary until the middle of the month, when, owing to heavy rains, there was a rapid rise. The Willamette rose steadily during the first half of the month, nearly reaching the danger line at Portland. A steady fall then set in and continued to the end of the month.

TABLE VIII.—*Heights of rivers above zeros of gauges, December, 1896.*

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn	1,934	14	......	......	......	......	......	......
Reeds Landing, Minn	1,864	12	7.0	1	1.9	29-31	4.3	5.1
La Crosse, Wis [a]	1,799	10	7.5	4	......	......	......	......
North McGregor, Iowa	1,739	18	7.7	12	2.1	1	5.9	5.6
Dubuque, Iowa [b]	1,679	15	7.6	12	1.2	2	5.0	6.4
Leclaire, Iowa	1,589	10	4.4	14	0.0	5,6	2.4	4.4
Davenport, Iowa	1,573	15	5.1	14	0.5	6	3.1	4.6
Keokuk, Iowa	1,443	14	5.0	18	0.4	4,7	2.7	4.6
Hannibal, Mo	1,382	17	5.3	17-19	1.1	9,10	3.1	4.2
Grafton, Ill	1,284	23	7.0	19,20	3.4	11	5.0	3.6
St. Louis, Mo	1,241	30	7.8	21	3.8	11	5.9	4.0
Chester, Ill	1,170	30	4.7	22	1.8	12	3.3	2.9
Cairo, Ill	1,073	40	24.9	7	13.2	31	18.9	11.7
Memphis, Tenn	843	33	16.6	9,10	5.8	1	11.2	10.8
Helena, Ark	767	37	22.3	10	9.5	1	16.6	12.8
Arkansas City, Ark	635	42	22.0	11,12	10.0	2	16.5	12.0
Greenville, Miss	595	40	18.7	12	8.0	2	13.7	10.7
Vicksburg, Miss	474	41	19.4	13,14	7.3	2-4	13.6	12.1
New Orleans, La	108	13	5.8	14,15	3.2	4	4.7	2.6
Arkansas River.								
Fort Smith, Ark	345	22	7.6	1,2	2.2	31	3.6	5.4
Dardanelle, Ark	250	......	8.0	1	1.6	30,31	3.3	6.4
Little Rock, Ark	170	23	9.2	3	3.5	30,31	5.3	5.7
White River.								
Newport, Ark	150	21	3.6	4	6.9	31	1.9	2.7
Illinois River.								
Peoria, Ill	135	14	7.5	1	5.4	28,30,31	6.5	2.1
Missouri River.								
Bismarck, N. Dak. †	1,201	14	......	......	......	......	......	......
Pierre, S. Dak. †	1,006	14	......	......	......	......	......	......
Sioux City, Iowa †	676	19	......	......	......	......	......	......
Kansas City, Mo	280	21	8.0	21	2.8	7	5.9	5.2
Boonville, Mo	191	20	6.5	24	4.4	6,7	5.4	2.1
Hermann, Mo	95	21	2.3	2	–0.6	9	0.9	2.9
Ohio River.								
Pittsburg, Pa	966	22	11.9	11	2.0	27,28	5.0	9.9
Davis Island Dam, Pa	960	25	12.1	11	3.6	27	6.6	8.5
Wheeling, W. Va	875	36	15.9	12	4.2	28,29	8.3	11.7
Marietta, Ohio	795	25	16.0	12	5.0	30	9.2	11.0
Parkersburg, W. Va	785	38	15.8	13	5.8	31	9.9	10.0
Point Pleasant, W. Va	703	36	20.4	2	4.3	31	11.4	16.1
Catlettsburg, Ky	651	50	27.5	1	6.0	31	15.5	21.5
Portsmouth, Ohio	612	50	28.0	1	7.6	31	16.7	20.4
Cincinnati, Ohio	499	45	29.2	3	10.1	30	19.7	19.1
Louisville, Ky	367	24	11.3	3	6.0	31	8.7	5.3
Evansville, Ind	184	30	23.5	5	9.3	31	17.0	14.2
Paducah, Ky	47	40	21.8	6	8.1	31	15.0	13.7
Alleghany River.								
Warren, Pa	177	7	4.8	10	0.8	28-30	1.9	4.0
Oil City, Pa	123	13	5.4	10	1.5	30	2.8	3.9
Parker, Pa	73	20	6.7	11	1.2	27,29	2.7	5.5
Freeport, Pa	26	20	10.4	11	2.3	26-28	4.9	8.1
Conemaugh River.								
Johnstown, Pa	64	7	2.5	10	0.8	29,30	1.5	1.7
Red Bank Creek.								
Brookville, Pa	35	8	3.7	9	1.0	1-8,15-31	1.3	2.7
Beaver River.								
Ellwood Junction, Pa	10	14	3.6	10,11	1.8	27-31	2.4	1.8
Big Sandy River.								
Louisa, Ky	26	20	16.4	1	4.0	30	7.5	12.4
Cumberland River.								
Burnside, Ky	434	50	17.0	1	1.1	31	3.8	15.9
Nashville, Tenn	175	60	28.9	1	3.5	31	10.3	25.4

TABLE VIII.—*Heights of rivers above zeros of gauges*—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Great Kanawha River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Charleston, W. Va	61	30	11.6	1	3.1	29	6.1	8.5
New River.								
Hinton, W. Va	95	14	6.3	1	1.3	27-29	2.7	5.0
Licking River.								
Falmouth, Ky	30	25	8.0	1	2.4	21-25, 29-31	3.4	5.6
Miami River.								
Dayton, Ohio	69	18	3.9	16	1.1	2	2.1	2.8
Monongahela River.								
Weston, W. Va	161	18	6.9	9	− 0.3	27-29	0.7	7.2
Fairmont, W. Va	119	25	8.6	10	1.1	8	2.5	7.5
Morgantown, W. Va	95	20	13.2	10	7.4	28-30	8.6	5.8
Greensboro, Pa	81	18	13.0	10	7.5	28-31	8.6	5.5
Lock No. 4, Pa	40	28	15.0	11	7.1	27-30	9.0	7.9
Cheat River.								
Rowlesburg, W. Va	36	14	6.0	9	2.8	28-31	3.5	3.2
Youghiogheny River.								
Confluence, Pa	59	10	3.7	1	1.3	29	2.1	2.4
West Newton, Pa	15	23	4.7	10	0.5	29	1.6	4.2
Tennessee River.								
Knoxville, Tenn	614	29	10.0	1	0.9	30-31	2.1	9.1
Chattanooga, Tenn	430	33	13.9	3	2.5	31	5.3	11.4
Bridgeport, Ala	390	.....	10.9	3	1.2	31	3.6	9.7
Florence, Ala	220	16	8.9	5	1.3	31	3.8	7.6
Johnsonville, Tenn	94	21	12.4	6	3.1	29,31	6.7	9.3
Wabash River.								
Terre Haute, Ind [a]	165	16	5.1	20	1.7	30,31	3.0	3.4
Mt. Carmel, Ill	50	15	9.1	1	3.0	31	5.3	6.1
Red River								
Arthur City, Tex	688	27	11.0	3	2.6	28-31	4.6	8.4
Fulton, Ark [b]	565	28	11.7	1	1.2	30,31	4.0	10.5
Shreveport, La	449	29	4.0	5	− 1.9	1	0.6	5.9
Alexandria, La	139	33	4.4	10	− 1.2	31	1.6	5.6
Atchafalaya River.								
Melville, La	100*	31	18.7	16	10.5	1	14.6	8.2

TABLE VIII.—*Heights of rivers above zeros of gauges*—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Ouachita River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Camden, Ark	340	39	15.0	1	4.1	31	6.3	10.9
Monroe, La	100	40	15.7	5	2.9	30, 31	7.9	12.8
Yazoo River.								
Yazoo City, Miss	80	25	3.6	9-11	− 1.8	30, 31	2.0	5.4
Cape Fear River.								
Fayetteville, N. C	100	38	15.4	2	4.8	30	9.0	10.6
Congaree River.								
Columbia, S. C	37	15	4.6	2	0.5	28, 29	2.4	4.1
James River.								
Lynchburg, Va	257	18	5.5	1	0.4	27, 28	1.4	5.1
Alabama River.								
Montgomery, Ala	265	35	6.4	5	0.5	31	2.2	5.9
Coosa River.								
Rome, Ga	225	30	6.0	1	1.0	30, 31	2.1	5.0
Tombigbee River.								
Columbus, Miss	285	33	− 0.1	6	− 2.9	28, 29	−1.9	2.8
Demopolis, Ala	155	35	6.9	4	− 0.7	31	1.7	7.6
Black Warrior River.								
Tuscaloosa, Ala	90	38	7.7	1	0.5	29-31	1.7	7.2
Savannah River.								
Augusta, Ga	130	32	17.6	16	5.8	31	9.8	11.8
Susquehanna River.								
Harrisburg, Pa	70	17	4.2	14	1.3	29	2.7	2.9
W. Br. of Susquehanna.								
Williamsport, Pa	35	20	5.0	11	1.3	29	2.8	3.7
Sacramento River.								
Redbluff, Cal	241	23	20.6	15	3.6	1	8.1	17.0
Sacramento, Cal	70	28	17.6	31	13.6	12, 13	15.8	4.0
Willamette River.								
Albany, Oreg	99	20	18.0	15	5.2	26	9.2	12.8
Portland, Oreg	10	15	14.2	15	5.5	2	9.2	8.7

* Distance to the Gulf of Mexico. † Frozen throughout the month. [a] Frozen 5-16 and 21-31. [b] Frozen 3-8. [c] Frozen 25-29.

SPECIAL CONTRIBUTIONS.

EQUIPMENT OF AN AERO-PHYSICAL OBSERVATORY.

By ALEXANDER McADIE, Local Forecast Official, San Francisco, Cal.

In response to a request by the Editor, Mr. McAdie has kindly allowed the WEATHER REVIEW to publish, in advance, the following extract from a paper submitted by him in 1894 to the Secretary of the Smithsonian Institution, in competition for the Hodgkin's Prizes. The use of the kite, the aero-plane, and the aero-motor, which has so greatly developed since that time, suggests, as Mr. McAdie states, a still further addition to the equipment. He also suggests that the magnetic outfit and the seismographic apparatus would be an appropriate addition, although rather outside of the direct line of atmospheric investigation. The list of instrumental equipment is as follows:

EQUIPMENT OF AN AERO-PHYSICAL OBSERVATORY.

BAROMETRY.

Standard barometers—Wild-Fuess, Fortin, Kew, United States Weather Bureau Standard.
Multiplying barographs—Richard, Marvin, Draper.
Aneroids—Redier or improved Hicks.
Statoscope for recording minute fluctuations of pressure, especially valuable during thunderstorms and gusts.
Sundell normal barometer.
Telebarometers, distant from each other not less than 1,000 feet in a horizontal direction and 500 feet in a vertical direction. This implies that the laboratory must be situated on the summit of a hill or mountain, with base stations. Buchan, in his résumé of the work done at Ben Nevis, intimates that some very important relations are thus discoverable.

THERMOMETRY AND HYGROMETRY.

Standard types of thermometers—exposed, wet bulb, maximum and minimum, water and soil.
Thermographs and self-registering psychrometers.
Assmann aspiration psychrometer.
Telethermographs and telehygrographs.
Fog indicators.

INSOLATION.

Actinometer (Schwolson.)
Langley's bolometer, with appropriate galvanometers for the exploration and mapping of the solar spectrum, particularly the infra-red portion.
Photographic records of the more prominent absorption lines due to aqueous vapor in the atmosphere, and comparison, after proper scale determination, with the intensity of standard solar lines with the ultimate aim of ascertaining the distribution of vapor in the atmosphere at various altitudes and variations therefrom.
Spectroheliograph. A good 12 or 14 inch photographic objective for investigating the relations of solar spots, faculæ and prominences.

NEPHOSCOPY AND PLUVIOMETRY.

Sunshine recorders of various types.
Nephoscopes and Pole star recorders.
Rain gauges and evaporometers.

ATMIDOMETRY.

Barus's device for showing colors of cloudy condensation.
Aitken's dust counter or coniscope.
The determination of the amount of haze or smoke present in the atmosphere is now quite neglected in meteorology, although a matter of very considerable importance to health. We should have daily records of the relative purity of the atmosphere.

ANEMOMETRY.

Anemoscopes.
Anemo-cinemograph—an instrument showing the varying force exerted by the wind, preferable to the old form of anemograph; and yet some further improvement looking to a fuller recognition of what has been termed "the internal work of the wind" is desirable.
Helicoid anemometer.
Clino-anemometer, or instrument for registering currents not horizontal.
Wind pressure gauge and suction anemometer.

THERMODYNAMICS AND CHEMISTRY.

Apparatus might be devised which would give graphically the thermodynamic conditions of the atmosphere. The volume,

pressure, temperature, and density of the air being known, we ought to be able to follow the isotherms and adiabatics through the varying conditions in cyclone and anticyclone at all levels. Thus Hertz has given the adiabatics for the dry, rain, and hail stadia, and it is practicable to follow a given air mass through the varying thermodynamic conditions.

ELECTROMETRY.

Proper apparatus for measurements in atmospheric electricity.

Mascart-Kelvin electrometers for the determination of the potential of the air. The type of voltmeter known as the multiple quadrant electrometeter, or substantially Lord Kelvin's air Leyden, should be installed with an automatic register for continuous records of the electrification of the air.

Elster and Geitel's apparatus, modified, for records of the air "leakage" of electrical charge under the influence of ultra-violet light.

Brontometer, for use in the study of the strains and stresses in air between highly electrified clouds or cloud and earth. The name brontometer is used, but some more appropriate type of instrument than the present is desired. It now gives the time of each lightning flash, the duration of thunder, the changes in direction and force of the wind, in temperature, humidity, and barometric pressure during a thunderstorm; but there is wanting the photographic auxiliaries to delineate the character of each discharge. The true character in space and the dimensions of the discharge are determinable by such means. The potential fluctuations added to such data will enable us to study the strains and ruptures in the atmosphere after the thunderstorm as completely as a plate of fractured armor can be studied after a test.

PHYSIOLOGY AND BIOLOGY.

The known properties of atmospheric air are clearly of great importance in all physiological and biological research. In the latter, atmospheric environment must be an effective factor in the variation of species, and in the former, at the very outset, do we not meet an intimate relation between the irritability of nerve and muscle and atmospheric conditions? How important to know the atmospheric conditions as influencing exhilaration and fatigue. The so-called "sensible" temperature, for example, enables one to live in the temperatures of the Northwest in winter, and renders temperatures higher by 30° elsewhere unbearable.

Such a laboratory, then, studying the properties of atmospheric air, would, we firmly believe, influence research in every department of applied science. In agriculture the value is apparent; in economics, history, hygiene, botany, geology, and biology questions now unanswered would be disposed of. In that much-dreamed-of consummation, the conquest of the air, when transportation shall be by air ships and communication by air runners or disturbances of the electrified air, the contributions to knowledge from such a laboratory would be incessant and without price. Aye, in directions now unthought of, the aero-physicist would push onward in the great region now unexplored.

SUNSTROKE IN CALIFORNIA AND ARIZONA.

By W. F. R. PHILLIPS, M. D., in charge of Section of Climatology.

The topic for this paper was evolved from the statistics collected when investigating the sunstrokes of August, 1896, a report on which was published in the MONTHLY WEATHER REVIEW for November, 1896.

During a considerable part of the month of July, 1896, the Pacific States suffered from a somewhat protracted spell of hot weather, during which, as will hereinafter appear, a number of cases of sunstroke occurred. The importance of this latter fact subsists in the peculiar reputation that the climate in general of this region has all along borne in respect to sunstroke. It is popularly supposed that sunstroke in the dry and hot climates of Arizona and California, and of the Cordilleran Region in general, is an extremely rare occurrence; indeed the statement is occasionally made that it never occurs in them.

Hirsch, in his magnificent work on geographical and historical pathology (Handbook of Geographical and Historical Pathology, Vol. III, 1886), expresses the current opinion of the day as to the freedom of the Trans-Rocky Mountain Region from sunstroke. He says:

In remarkable contrast to the frequency of the seizure in those parts of the North American Continent of which we have spoken heretofore [the Atlantic Seaboard and Central States], is the comparative immunity of the Pacific Coast. According to Blake and Gibbons there was hardly anything heard of sunstroke among the gold diggers in California.

The care, patience and labor with which Hirsch collected statistics, and the conservatism and ability with which he compiled and discussed them, give to his statements great authority. How far the reputation of the Pacific Region for immunity from sunstroke may rest upon the currency of any of these statements it is not the object of the writer to discuss. It is, however, proper to observe that the authorities, Blake and Gibbons, upon whom Hirsch rested his statement as to the frequency of sunstroke in the Pacific Region, wrote, respectively, in 1852 and in 1857, when this vast region was but beginning to have a population, and when (considering the peculiar circumstances and excitement attending the rush of people to the gold fields) it is highly probable that little attention was paid to careful registration of statistics regarding disease and its correlated phenomena.

The census of 1850 gave California a population of 92,597; in 1860 the population of Arizona, then a county of the territory of New Mexico, was given as 6,482. To-day California has more than 1,200,000, and Arizona, perhaps, more than 60,000 inhabitants. The populations of the other states and territories comprised in the Cordilleran Region have also increased greatly since Blake and Gibbons wrote.

In weighing the statements concerning the climatology of this region by early writers, we should take into consideration the sparsely settled condition of the country, the character and mode of life of its earlier settlers, the virginity of the soil and its freedom from the contaminations that accompany density of population, the lack of means of ready communication and the probable want of system in recording and registering the facts pertaining to the medical climatology of the country.

As relevant to the special subject of this paper the following extracts from two California journals are taken from issues just prior to the termination of the very hot weather previously referred to:

All over the great interior valleys of California men and women have succumbed to the terrible heat of the fire month. Fresno, Merced, Bakersfield, Stockton, Sacramento, Los Angeles, San Bernardino, Riverside, and many other towns have furnished victims for the prostrating solar rays. * * * The heat was not greater than has often been encountered before, but the atmosphere lacked that dryness which has always been the pride of California, and as a result thermic fever has claimed its victims by scores. * * * So thoroughly grounded in the old practitioner is the belief that in California "neither hydrophobia nor sunstroke" is ever encountered, that it is only after the most indubitable evidence that we can be persuaded to call the dread heat stroke by its proper name.—*San Francisco Examiner, July* 26, 1896.

The heated term commenced July 3 and lasted nineteen days. The first victim was J. Pellegrini, a laborer on the Valley road, who died at Herndon. Joe Toma, an employee at the City Bakery, succumbed to the heat a few days later. Then came in rapid succession the deaths of Lena Johnson, of Easton, John Stokes, and James Downing.

Such a record has never occurred in the history of Fresno, even in the hottest summers. The usual percentage of sunstroke cases in the country is so small that it is not worth consideration. * * * Weather Observer Bolton says that a striking feature of the three weeks' spell was the number of warm nights. Usually there are only about three nights in July when it is difficult to obtain sleep, the temperature usually falling to 60° with a refreshing breeze. In the past three weeks, however, a temperature of 75° and upward was noted on nearly every night from the 4th to 13th, inclusive. * * * the humidity was also higher than for eight years past, being as high as 55 to 65 per cent in the mornings.—*Fresno Daily Evening Expositor, July* 24, 1896.

The following statistics of sunstroke in California and Arizona were obtained in response to the circular issued by the Chief of the Weather Bureau, August 20, 1896:

Phœnix, Ariz.	6	deaths from sunstroke.	
Fresno, Cal.	4	" " "	
San Luis Obispo, Cal.	1	" " "	
Red Bluff, Cal.	1	" " "	5 cases recovered.
Total	12		5

Total events 17.

All the above sunstrokes occurred in July, 1896, with the exception of two of the deaths at Phœnix, Ariz., one of which occurred in June and the other in August.

The authorities for the above statistics are for Phœnix, Ariz., A. M. Tuttle, City Health Officer; Fresno, Cal., Dr. C. H. Adair, County Health Officer; San Luis Obispo, Cal., Dr. G. B. Nichols; Red Bluff, Cal., Drs. G. W. Westlake, J. A. Owen, and John Fife. Therefore, on excellent information, we have for several localities in California knowledge of eleven cases of sunstroke, and for one locality in Arizona of six cases of sunstroke, in all seventeen cases, fifteen of which occurred during the hot weather that prevailed over the Pacific Region during a part of July, 1896.

The following comparison, instituted between the sunstrokes occurring in the Cordilleran Region during July, 1896, and those occurring in the Appalachian Region in August, 1896, is deemed of sufficient importance to bring to notice.

Death rates from sunstroke per 100,000 of population, calculated for the several localities and months.

Place.	Month.	No. deaths from sunstroke.	Population, census 1890.	Death rate.
New York } Brooklyn }	Aug., 1896	1,045	2,321,644	45
Philadelphia	Aug., 1896	218	1,046,964	21
Baltimore	Aug., 1896	98	434,439	23
Boston	Aug., 1896	66	448,477	12
Total	....	1,427	4,251,524	33
Fresno County, Cal. (including Fresno)	July, 1896	4	32,026	12
San Luis Obispo County, (including San Luis Obispo)	July, 1896	1	16,072	6
Tehama County (including Red Bluff)	July, 1896	1	9,916	11
Total	....	6	58,014	10
Maricopa County, Ariz (including Phœnix)	July, 1896	4	10,986	36
Total	....	10	69,000	14

In the preparation of the above statement regard has been had simply to the statistical facts as reported. In order that the rates shown for each locality might be as fairly comparable with one another as practicable, they have been calculated for deaths only and for the populations as given by the census of 1890. No allowance has been made for any change in population since that time. These rates are, therefore, probably a little too great in every instance. The reason for using deaths instead of cases is that the information regarding the former is more complete.

On their face these rates show that sunstroke is about as frequent in certain localities of California and Arizona as it is in some of the large cities of the Atlantic Coast States.

Although the statistics are few and for this reason the facts that they bring out may be regarded by some as without significance, yet they seem to intimate that we may, perhaps, hear more of sunstroke in the Cordilleran States as the densities of their populations approximate those of the Atlantic and Central States, just as we are now hearing of the development of phthisis in climates where for years it was supposed that it was impossible for tubercular disease to originate.

These statistics, when considered in conjunction with the meteorologic conditions prevalent at the time, may be held to demonstrate that the causation of these particular sunstrokes was not high relative humidity, as suggested by some of the western daily papers. To prove this proposition it is only necessary to show that the meteorologic conditions were at the time such as to permit a free evaporation of the perspiration.

Selecting the stations for which we have meteorologic data, *i. e.*, Fresno, Cal., and Phœnix, Ariz., and only those days upon which sunstrokes were reported and selecting out of these only that day which had the highest relative humidity we find the following: The days of highest relative humidity of those on which sunstroke occurred were at Fresno, July 11, and at Phœnix, July 13. The meteorologic conditions with respect to temperature, humidity, and wind movement on these days were as follows:

	Mean temperature.	Mean dew point.	Mean relative humidity.	Total wind.
	°	°	*Per cent.*	*Miles.*
Fresno, Cal., July 11	94	47.5	25	175
Normal for July	85	44	24	....
Phœnix, Ariz., July 13	90	66.5	56	118
Normal for July	90	63	41	....

These meteorologic conditions, upon their face, appear favorable for evaporation, and the following confirms this conclusion:

Fitzgerald has given an empirical formula for calculating the amount of water evaporated from a surface of water under any given meteorologic conditions. This formula was deduced from a series of accurate observations made from 1876 to 1882 at the Chestnut Hill Reservoir, near Boston. The formula is approximately (Report C. S. O., 1887, part 2, p. 376):

$$E=0.0166\,(V-v)\,(1+\tfrac{1}{2}\,W)$$

in which

E = the depth of water in inches evaporated in one hour.

V = vapor pressure in inches of mercury corresponding to the temperature of the water.

v = vapor pressure corresponding to the dew-point in the free air.

W = velocity of wind in miles per hour at the level of the water surface.

In the evaporation of the perspiration of the human body we may take for granted that the temperature of the perspiration will be the same as that of the skin, and we may assume, without much likelihood of error, that on a very warm day the temperature of the skin is between the average temperature of the body, 98°–99° F., and that of the wet-bulb thermometer. We shall be safe in saying that the temperature of the perspiration under the meteorologic conditions above stated was at least as high as 90°. Taking 90° then as the temperature of an evaporating surface of water Fitzgerald's formula shows that from a perfectly wet surface, exposed under meteorologic conditions as they existed at Fresno, July 11, 1896, and Phœnix, July 13, 1896, there would have been evaporated in twenty-four hours a layer having a depth of 1.95 and 1.2 inches, or from each square foot of surface about 276 and 173 cubic inches of water, respectively.

The superficial area of an average man is given as 16 square feet, therefore, from such a surface and under these assumptions, there would have been evaporated in twenty-four hours at Fresno, July 11, 1896, and at Phœnix, July 13, 1896, something like 18 and 16 gallons, respectively.

After making due allowance for the effects of clothing, and for the fact that all the superficial surface of the individual is not equally exposed to evaporative influences, and also for the fact that at the level in which man habitually moves the velocity of the wind is somewhat less than that given by Weather Bureau anemometers, it would yet seem that at Fresno and Phœnix, on the dates specified, a man could have evaporated from three to four times as much water as would have been normally supplied by the perspiration, and, therefore, that the causation of sunstrokes upon those days could not have been due to any meteorologic obstacle in the way of the evaporation of the water of perspiration. In other words these sunstrokes were not caused by the traditional high rela-

tive humidity. Without going into details it can be stated that practically the same argument applies to the other days and places.

From a consideration of the various statistics from different localities that have come under the writer's notice, it seems that sunstroke is as frequently associated with a very low relative humidity as it is with a very high relative humidity. Apparently the first one to call attention to the occurrence of sunstroke with a low relative humidity was Dr. A. J. Miles, of Cincinnati, in a paper read before the American Public Health Association in 1881 ("Sunstroke Epidemic of Cincinnati," Public Health, Vol. VII), and this present paper confirms his statements.

RELATIVE HUMIDITY INSIDE AND OUTSIDE OF BUILDINGS.

By A. J. Henry, Chief of Division of Records and Meteorological Data.

In Weather Bureau Bulletin No. 19—Report on the Relative Humidity of New England and Certain Other Localities—some results are given of observations on the relative humidity within and without the Weather Bureau building in Washington, D. C. The conclusion there reached was that outside hygrometric observations could not be depended upon to give the humidity conditions within, except when the temperatures outside and inside were substantially the same.

The observations, as will be seen by a reference to the bulletin above mentioned, consisted in a simple determination of the relative humidity of the air in the observer's office and in the standard thermometer shelter on the roof. They were continued from the date of publication of the bulletin above mentioned, April 22, with a few interruptions, to June 18, 1896.

The new material confirms in a general way the conclusion heretofore reached. It is worthy of mention, however, that while there is close agreement between the relative humidity inside and outside, so long as the temperatures are the same, many cases will arise when the inside and outside temperatures differ by a considerable amount even in the warmer part of the year.

The greatest differences between the relative humidity inside and outside are found when the outside air is saturated, or nearly so, and, also, after a period of rain, when the temperature of the outside air has fallen considerably below the temperature of the room. During the period included between the dates above mentioned the differences between outside and inside (outside—inside) ranged from 36 per cent below to 28 per cent above; that is to say, the inside fell 36 per cent below the outside on one occasion and rose 28 per cent above it on another.

On 14 days out of the 45 (31 per cent of the time) the variation was over 10 per cent at the hour of observation, 2 p. m.

It is obvious, from a consideration of the weather conditions at the time some of the greatest differences were observed, that better ventilation, or perhaps a more perfect mechanical mixture of the air outside and inside, would have resulted in a closer agreement between the calculated humidity values.

The observations were made originally for the purpose of determining how far the ordinary hygrometric observations made in standard roof shelters could be safely used as indicating the probable moisture conditions in cotton mills in the immediate vicinity. It has been shown that the variation in a closed room is much smaller than in the open air as would naturally be expected, and that the agreement between the humidity of a room and that of the outside air depends almost wholly upon the amount of ventilation and the temperature of the room. It is possible, of course, to increase the moisture in a room much beyond the natural amount, but it will always be necessary to provide for a renewal of the air at short intervals, since the limit of endurance in a still, hot and damp atmosphere is soon reached.

Relative humidity inside and outside of the Weather Bureau building, Washington, D. C.

Date.	Dry thermometer.		Wet thermometer.		Relative humidity.	
	Inside.	Outside.	Inside.	Outside.	Inside.	Outside.
1896.	°	°	°	°	Per ct.	Per ct.
March 2	72.0	39.0	54.0	36.0	28	75
4	67.5	38.0	50.0	32.0	26	50
5	71.0	41.5	52.0	36.0	24	58
6	74.0	45.5	54.0	40.5	33	64
7	74.0	60.5	56.0	54.5	30	68
9	73.0	46.5	54.0	42.5	25	72
10	70.0	45.0	53.5	39.5	27	61
11	71.0	33.5	56.0	33.5	37	100
12	69.5	27.5	52.0	23.5	26	54
13	72.0	30.0	55.0	27.0	31	67
14	72.0	32.2	53.5	26.0	26	38
16	72.0	33.5	57.0	33.5	38	100
17	68.0	37.0	53.0	33.0	34	66
19	73.0	62.0	63.0	58.0	57	79
20	70.0	36.5	54.0	32.0	33	62
21	73.0	43.0	55.5	39.0	30	70
27	72.0	40.0	55.0	32.0	31	38
28	74.0	49.5	54.0	41.0	33	46
31	74.0	58.0	38.0	50.0	36	56
Mean	71.7	42.0	53.7	37.3	32	64
April 7	70.0	41.0	53.0	34.0	29	46
8	73.0	66.0	54.0	38.0	25	46
9	66.0	50.0	51.0	40.0	32	38
10	72.0	43.0	58.0	40.5	42	81
11	75.0	47.0	60.0	44.0	40	79
12	......	......	......	......	......	......
13	80.0	79.0	65.0	65.0	44	47
14	82.0	83.0	67.0	69.5	43	49
15	79.0	81.0	62.0	62.0	37	33
16	84.0	86.0	66.0	68.0	38	39
17	88.0	91.5	70.0	71.5	40	37
18	89.0	91.0	69.5	70.5	36	37
21	81.0	81.0	65.0	65.0	41	41
22	74.0	63.5	55.5	49.0	28	32
Mean	77.9	69.5	61.2	55.2	37	47
May 2	73.0	63.0	65.0	60.0	65	84
4	74.0	75.5	66.0	60.0	66	38
5	81.0	82.5	65.0	64.5	41	36
6	74.0	56.0	64.0	49.5	58	63
7	69.0	63.0	57.0	52.0	47	46
9	78.0	87.5	70.0	69.0	67	38
11	90.0	91.5	69.5	68.0	36	28
12	86.0	86.0	66.5	66.0	35	34
13	77.8	77.8	67.0	66.2	57	54
14	75.0	74.0	70.0	69.0	78	78
16	79.2	77.0	56.7	57.5	41	28
18	88.0	91.0	74.0	68.0	52	30
20	72.0	56.0	64.0	55.5	65	97
21	69.8	63.0	63.8	61.0	72	89
22	75.8	76.0	70.8	71.8	78	82
23	75.7	75.0	64.0	63.5	52	53
25	71.0	68.0	64.8	63.0	71	76
26	77.3	80.0	71.0	71.5	73	66
27	78.0	79.0	66.2	65.0	54	47
28	78.0	85.5	70.0	73.5	67	56
29	75.0	73.0	61.0	58.0	44	39
30	74.0	73.5	61.0	61.0	47	48
Mean	76.9	75.2	65.8	63.3	58	55
June 1	73.0	72.0	61.3	57.6	51	40
2	72.7	71.7	60.0	57.0	47	39
3	74.8	74.0	61.0	60.0	45	43
4	77.0	66.0	66.0	64.0	54	90
5	75.2	73.8	68.0	65.8	69	66
6	80.5	80.5	67.5	67.5	51	51
8	86.0	87.5	76.0	75.0	57	57
9	80.0	77.0	71.0	68.5	64	65
10	72.5	76.5	60.0	66.0	47	57
11	76.0	77.0	65.0	60.0	55	35
12	78.0	81.5	61.0	61.5	36	30
13	73.0	62.3	65.0	65.8	65	82
15	71.0	68.5	64.5	62.5	70	72
16	73.5	72.5	68.5	67.5	78	78
17	75.0	74.5	69.0	68.5	74	74
18	78.0	79.4	68.0	69.0	60	59
Mean	76.0	74.7	65.7	64.8	58	59

AUTOMATIC CLOUD PHOTOGRAPHY.

By Oliver L. Fassig, Observer, Weather Bureau.

The following interesting items are quoted from a letter recently received by the Editor from Mr. Oliver L. Fassig:

Through the kindness of Dr. von Bezold and Professor Sprung, I spent the whole of the month of October at the Potsdam Observatory, and took part in the daily observations of cloud height and velocity which are being carried on there in accordance with the International

Cloud Committee. Photographs are taken with the phototheodolite every two hours from daylight to dusk. Already over 500 plates are ready for measurement. I assisted daily in the cloud photography, and also measured some of the plates and calculated the heights and velocities, both by formula and by a very convenient graphic method which is to be used in most of the work. I found this month's work most interesting and profitable. There is a great field for good work in this direction. The method is far more reliable than that of the direct theodolite work, and more convenient. The expense of maintaining a few such stations is not great where the work can be done in connection with stations already established.

An interesting experiment has just been tried at the Potsdam Observatory in the way of an automatic apparatus for cloud photography. The first cloud picture was made about two weeks ago. The method proves to be entirely feasible. The apparatus weighs fully 1,000 pounds. It is built of brass, and is inclosed in a case about 5 feet by 2 feet by 2 feet. The first impression on looking at it is one of bewilderment at the complication of wheels, levers, and chains; but everything is solidly built, and apparently will not easily get out of repair. The apparatus is entirely automatic. You simply "press the button and the machine does all the rest." About twenty photographic plates are put into one end of it to start with. Immediately on closing the electric circuit a large weight begins to descend in both machines (there are of course two similar machines, one at each station and electrically connected). The descent of this weight opens the outside lid of the case, which protects the apparatus against the weather. As soon as this is done the shutter of the objective opens and closes, giving about a half second exposure of the plates. This done, an endless chain is set in motion which carries the exposed plate to the forward end of the case and at the same time brings a fresh plate from the rear and places it in position under the objective ready for the next exposure. This done, the lid closes and a bell rings as a signal that the performance is over. The apparatus is restricted to the taking of one zenith and two horizon exposures at an angle of 90°. The other two horizon exposures could be added, but this would further complicate the apparatus. These two automatic machines are soon to replace the two phototheodolites now in use. No observer will be necessary at the substation, as the man at the principal station decides upon the time and the portion of the sky to be photographed and closes the circuit which automatically sets both machines in motion. The present form of this automatic apparatus is not likely to come into general use, as it is too complicated and expensive. The cost will probably reach $1,000 for each machine. The phototheodolites can probably be purchased for about $200 each, and have a greater range of usefulness.

THE BALLOON ASCENSIONS OF NOVEMBER 14, 1896.

By Dr. R. ASSMANN, of Berlin.

In the November REVIEW, page 415, we have noticed the temperature results of the simultaneous balloon ascensions, as published by Mascart in the Paris *Comptes Rendus*, and by Lancaster in *Ciel et Terre*, and have drawn some conclusions therefrom. We are indebted to Dr. Assmann and Mr. Oliver L. Fassig for an early copy of the *Anzeiger*, Berlin, November 23, from which we copy the following interesting account of the work done on the 14th of November:

After a short sketch of the recent history of the progress of meteorological ballooning, in which he gives full credit to Hermite and Besançon for their work with sounding balloons, and states that the Berlin scientists promptly followed the example of their French colleagues, Assmann says:

In Paris, Berlin, and St. Petersburg, for some time past everything had been ready for a simultaneous ascension, while in Strasburg and Munich preparations were quickly made after the close of the Meteorological Conference in Paris in September. Therefore the proposition emanating from Paris to make a first experiment in this direction during the night of November 13–14 met with general approbation. The identity of methods of observation must, of course, be considered as the most important condition for the attainment of comparable results; therefore, Strasburg and Berlin ordered self-registering apparatus at once from the famous firm of Richard Bros., in Paris, and which were properly tested by Hermite and Besançon.

The experiments were made in the following manner: In Paris the new balloon "Aerophile III," constructed by Besançon out of very light varnished silk and containing 400 cubic meters, ascended at 2 h. 6 m. (? a. m.). At the same time, that is to say, at 2 h. 22 m., the balloon "Strasburg" of 320 cubic meters ascended from Strasburg. At 2 h. 51 m., the 250 cubic meter balloon "Cirrus," also made of varnished silk, ascended from Berlin; but in consequence of its former employment as a military balloon and of the damages it had sustained in six previous ascensions, among them the highest as yet made, 20,000 meters, it was full of breaks and repairs.

In addition to these there was sent up at St. Petersburg a similar registering balloon whose dimensions are not yet known to the writer. As complementary to these balloons, which were destined for the highest altitudes, other ascensions were made by balloons manned by aeronauts and equipped for scientific observations; of these the balloon "Akademie," with Dr. Erk, as observer, ascended at Munich at 6 h. 47 m. (? a. m.); at 2 h. 44 m., and therefore nearly simultaneous with the registering balloon "Cirrus," the military balloon "Bussard," of 1,300 cubic meters capacity, ascended at Berlin with First Lieutenant von Kehler as aeronaut, and Berson, the well-known "German Glaisher," as meteorologist; at 3 h. 15 m. a military balloon ascended at Warsaw, and at 4 a. m. a similar one at St. Petersburg.

Thus, therefore, except at Munich, the ascensions were nearly simultaneous at all places; that is to say at about 2 o'clock, Paris time, simultaneously from Paris to St. Petersburg, seven balloons equipped for scientific purposes were floating in the air, one at Paris, Strasburg, and Warsaw, and two at Berlin and St. Petersburg, respectively. The following accounts of these ascensions and their results have been received.

The registration balloon, ascending at St. Petersburg, attained only an altitude of 1,500 meters when it burst; the military balloon, manned by observers, attained 5,000 meters altitude and a temperature of the air of —27° C., or according to another telegram, only —24° C.; after a voyage of eight hours it descended near Pskoff, southwest of St. Petersburg, at a distance of 260 kilometers. At Warsaw, by order of the Russian Minister of War, a second military balloon ascended which was driven by a north-northwest wind into Galicia, where it descended near Brzozoff, at a distance of 300 kilometers from Warsaw; nothing has yet been learned as to the altitude and temperature attained in this voyage nor the time of its duration. The balloon sent up by the Munich Association for Aeronautics attained its greatest altitude at 3,400 meters, and descended after a voyage of seven and one-quarter hours, in the neighborhood of Lungitz, near Linz in Austria, having traveled 200 kilometers almost directly eastward from the point of ascent; nothing is yet known as to the observed temperatures. The registration balloon "Strasburg," ascending from Strasburg, after a voyage of an hour and a half (during which it attained 8,000 meters altitude and a minimum temperature of —30° C.) descended in the Black Forest, where it was soon afterwards found. (The movement was, therefore, in an easterly direction.) It is peculiar that the registration of the lowest temperature, —30°, C., occurred at the altitude of 6,000 meters, and that higher temperatures were shown at greater altitudes.

At Paris the registration balloon "Aerophile III" ascended in calm but cloudy weather and took a direction toward the north-northeast, but disappeared from view in a few seconds. To the greatest anxiety of all interested nothing was heard of this balloon for many days, so that it was feared that it had fallen into the North Sea. Because of some remarkable phenomena reported from Wulferstedt and Ummendorf, localities lying west of Madgeburg, it was believed that the missing balloon might have some connection therewith, since a journey of about 800 kilometers could not be considered improbable. In fact, our registration balloon "Cirrus" in its first voyage had landed in Bosnia, having described 1,000 kilometers in ten hours. After all instructions had been sent out for seeking the balloon in that region the agreeable news was received that "Aerophile III," after a voyage of five and a half hours had descended near Graide, in Belgium, 235 kilometers northeast of Paris; it had attained an altitude of about 15,000 meters and temperature of —63° C.

The registration balloon "Cirrus," starting from Schoenberg near Berlin (which in its six previous voyages had penetrated higher into the atmosphere than any other piece of apparatus made by human hands, and in its flight towards Bosnia had attained 15,500 meters, toward Minsk, in Russia, 18,300, and toward the Danish island, Lolland, had attained 21,000) now made its last, its funeral voyage. The balloon material (varnished silk) frequently mended, and become defective, could no longer stand the great resistance of the air, due to the rapid ascent, and at 6,000 meters altitude it split, so that after an hour's voyage it sank to the earth. In consideration of the circumstance that the registration apparatus ordered from Paris, had been received only a few hours before the voyage, and could, therefore, not be again compared with the standard, two registers—a barograph and a thermograph, similar to our home apparatus—were, for the sake of certainty, fastened with the Paris instrument in the basket that carried the apparatus, and which was wrapped in a bright metallic paper (blank Nickel-papier); by this addition the weight was increased by many kilograms, but on account of the buoyancy of the pure hydrogen gas used by the Aeronautic Corps of the Army, this would not have prevented the balloon from attaining the height of 16,000 or 17,000 meters if it had not been brought to a premature descent by the above-mentioned break in the material. This precaution proved to be very advantageous, for, by reason of some one of the unavoidable shocks attending the preparation for the ascent the recording pen of the French thermograph must have become loosened from its fastening so that this part of the apparatus did not work. On the other hand, the German thermograph from the workshop of R. Fuess, in Steglitz, which had been carefully tested a few days before, showed in a very interesting way that the temperature rose from —4° C., near the earth's

surface, up to an altitude of several hundred meters, and again reached —4° at the altitude of 3,000 meters. At the highest altitude of 6,000 meters there was registered —25.6, and during the rapid fall of the balloon, the so-called inversion of temperature was again shown in the lower strata. The balloon, which at first moved rather rapidly toward the northwest, must have met rather high up a feeble current of air blowing from the north, which again carried it toward the south and allowed it to fall gently on the highest trees of the Grünwald. The fact that it descended during the nighttime, that is to say about 3h. 50m. a. m., was the reason why it remained for one and a quarter days undiscovered. It was first seen on Sunday morning by Herr Jochens as he was walking out, who perceiving that it would be impossible to get the balloon down without technical assistance, took the trouble to personally notify the officers of the balloon corps. With much labor and not without serious danger to life, a captain of that corps was able on Monday to bring the balloon in fragments down from its airy location, in fact a portion of the material, together with the network, was left in the tree. But the meteorological apparatus was brought to the earth uninjured, so that the reward of 50 marks, promised for the rescue of the balloon, could properly be paid to the energetic balloon corps.

The military balloon "Bussard," of 1,300 cubic meters capacity, and which by the assistance of the commander of the balloon corps, who had so often helped us in our scientific ascensions of the past years, was filled with 1,000 cubic meters of hydrogen and ascended a few minutes before the "Cirrus," also moved, at first, rapidly toward the northwest but after it had attained its position of equilibrium at an altitude of about 1,500 meters, it gradually swerved towards the north-northwest, which direction it maintained during the remainder of the rather slow voyage. Here, also, the increase of temperature with ascent in the lower strata, as registered by "Cirrus," was observed with perfect clearness; the temperature rose from —4° to + 1° C. and only regained the first value at an altitude of 3,000 meters. During the nighttime the balloon remained at an altitude of less than 2,000 meters, but after sunrise it began to ascend steadily. As the aeronauts saw that they were approaching the coast of the Baltic they decided that in case the coast should be reached before noon and a wind should blow stronger from the south, they would attempt to pass over the Baltic and land either in Denmark or its neighborhood. Unfortunately the wind at their altitude did not increase to the necessary extent, as it usually does, so that at 2h. 21m. p. m., therefore, after a voyage of eleven and a half hours they sorrowfully descended at Volkshagen, south of Ribnitz in Mecklenburg, 206 kilometers north-northwest of Berlin. In the descent, since the surface wind blew with unexpected force, the balloon dragged for a little but no serious injury occurred thereby; the temperature —24.4° was observed at an altitude of 5,650 meters.

If now we review the results so far as known of these associated international experiments, we have the following: Of the four simultaneous ascents of unmanned registration balloons, the French attained the greatest height, about 15,000 meters, and the lowest temperature, —63° C.; next to this comes the Strasburg balloon with about 8,000 meters altitude and —30° C. temperature. Both of these were perfectly new balloons and considerably larger than ours, which ascended to 6,000 meters and recorded a temperature of —25.6°. The Russian balloon, probably also an old military balloon, attained only 1,500 meters. Of the four manned balloons, that of our own balloon corps, ascended the highest, viz, to about 5,700 meters and found a temperature of —24.4° C. The Russian balloon, which ascended in St. Petersburg, attained about 5,000 meters, where —27° or —24° was observed; the Munich balloon attained 3,400 meters; as to the two balloons that ascended at Warsaw, the maximum height is not known. Of further interest is the direction taken by each balloon and the corresponding mean wind velocities. The St. Petersburg balloon was carried by a north-northeast wind at an average velocity of 9 meters per second. The Warsaw balloon had a north-northwest wind. The Berlin military balloon had an exactly opposite south-southwest wind with a velocity of 5 meters per seconds. The Munich balloon had a direct west wind of 8 meters per second; similarly the Strasburg balloon had a west wind, but the Paris balloon had a southwest wind of 12 meters per second.

TEMPERATURES OF NOVEMBER AND DECEMBER, 1896.

By Prof. H. A. HAZEN (dated January 25, 1897).

There was a remarkable reversal of temperature conditions in the United States in December as compared with November. As shown in the November WEATHER REVIEW, page 414, the coldest November in twenty-seven years was experienced in Montana, while the warmest of seventy-five years was noted in Philadelphia. During December, Havre, Helena, and Miles City each showed a temperature 12° above normal. This has been exceeded but once at Havre (Assinniboine), it has been equaled but once at Miles City, and at Helena temperature was the highest since observations of the weather service began. On the Atlantic Coast the great heat of November gave way to temperatures far below the normal: New York, —3.7°; Augusta, —4.1°.

It is interesting to inquire whether the cold area of the west was gradually transferred to the east or whether we must look for some other explanation of these anomalous conditions. The weekly temperatures have been charted for the whole country, and these charts do not show any progression of a cold area from west to east. On turning to the tracks of low and high areas in the two months we find a remarkable similarity in their general tendency, with the single exception that there was quite a long period of high pressure in the middle Plateau Region and two highs very slowly moved from the middle Pacific in December which had no counterpart in November. If we turn to the two charts of mean pressure in the two months, we find the following very significant changes: The high pressure, 30.35, to the north of Montana in November moved to the middle Plateau Region (30.32 at Idaho Falls and 30.31 at Salt Lake City). The high pressure off the Carolina coast in November moved to east Tennessee and west Carolina. This distribution of pressure in the West caused southerly and southwesterly winds in Montana, with corresponding high temperature in that region.

The high area over the Atlantic in November carried warm southerly and ocean winds, but in December the center of the subpermanent high pressure was wholly over the land, and the clear skies permitted intense radiation of heat from the earth's surface. It should be noted that the temperature in the middle Plateau was 1.7° above normal at Salt Lake City and 4.6° at Idaho Falls. In the latter case it seems probable that the radiation effect was much diminished by the proximity of a series of storms traveling from the moist and warm Pacific Coast to the north of Montana. It is not possible to account fully for all the temperatures noted, and we must look to moisture and other conditions at several thousand feet above the earth for a more complete elucidation of such anomalies.

NOTES BY THE EDITOR.

SIR ISAAC NEWTON AND HIS KITES.

Mr. Oliver L. Fassig, formerly Librarian in the Weather Bureau, who has taken a year's leave of absence without pay in order to study meteorology and physics in Germany, calls our attention to the fact that perhaps the remark by Professor Marvin in the April REVIEW, page 115, "Sir Isaac Newton is said to have taught the boys how to fly their kites," does not do full justice to that eminent man.

Our knowledge of Sir Isaac's experiments with kites is based upon two paragraphs in Brewster's Life of Sir Isaac Newton, published in Edinburgh in 1855. On page 11 of Vol. I, Brewster, apparently on the authority of Dr. Stukely's manuscript, which is still preserved among the "Portsmouth manuscripts," says:

> With this view he introduced the flying of paper kites, and he is said to have investigated their best forms and proportions, as well as the number and position of the points to which the string should be attached. He constructed also lanterns of crimpled paper, in which he placed a candle, to light him to school in the dark winter mornings; and in dark nights he tied them to the tails of his kites in order to terrify the country people, who took them for comets.

This is related to have occurred while Sir Isaac was living at Woolsthorpe and attending the public school at Grantham, probably in the year 1655, when he was about thirteen years old. A second paragraph occurs on page 16 of the same volume, which reads as follows:

It is about this time (1657) also that he seems to have paid some attention to the subject of the resistance of fluids, to which his experiments with water wheels would naturally lead him. Mr. Conduitt (Sir Isaac's nephew) apparently on the authority of Mrs. Vincent (an intimate friend of Sir Isaac in his youth) informs us that even when he was occupied with his paper kites he was endeavoring to find out the proper form of a body which would experience the least resistance when moving in a fluid.

This item is apparently copied by Sir David Brewster from the manuscripts collected by Mr. Conduitt before 1729, as material for his own memoir of the great philosopher. The precise wording of the Stukely and Conduitt manuscripts is, I suppose, not followed by Brewster in the paragraphs above quoted.

The above paragraphs are apparently those on which Poggendorff bases the statement made by him on page 659 of his *Geschichte der Physik*, "Even playthings, such for example as the kite, served him not so much as a direct means of recreation, as an opportunity for reflection as to how these could be best constructed in order that the wind should act most powerfully upon them."

The Editor has, unfortunately, not at hand any of the other numerous publications relative to the life of Sir Isaac Newton; but considering the thoroughness of his insight into the play of forces in all manner of cases, we can not doubt but that Sir Isaac arrived at a satisfactory theory of the mechanics of the problem. Nevertheless it still remains true, as Professor Marvin has stated in this connection, that a search for the literature bearing upon the mechanics of the kite in action has proved nearly fruitless, and his own published memoir on the construction of a kite, and another that will soon be published, on the theory of the kite, constitute the first important publications on this subject, and will prepare the way for future progress in the use of this important piece of meteorological apparatus.

The Editor understands that Professor Marvin considers the combinations of balloon and kite and various complicated forms objectionable on the score of efficiency, although they may, sometimes, be necessary in order to overcome special difficulties. The readers of the MONTHLY WEATHER REVIEW will, we are certain, be pleased to hear from any who have made experiments with various forms of kites.

EARLY MEASUREMENTS OF THE VELOCITY OF THE WIND.

We are indebted to Mr. Oliver L. Fassig for an interesting item of history as to early measurements of the velocity and force of the wind. In the September REVIEW, on page 335, we have stated that the simplest measurement of the velocity of the wind is made by observing the speed of light bodies, such as feathers or soap bubbles, carried along by it. Questions of inertia or of the resistance of any heavy object to the force of the wind do not enter into the calculation of these results if the light object remains in the air long enough to attain the same velocity as the wind itself; therefore this method is much more direct and not encumbered with the theoretical difficulties that attend the method described on page 335, as invented in his early youth, by Sir Isaac Newton.

The observation of the velocity of very light floating bodies was made with much care by Derham of England in his determination of the velocity of sound; but earlier than this, and, in fact, the earliest record that the Editor is aware of, is the following, quoted from Poggendorff's *Geschichte der Physik*, p. 123:

The writings of Geronimo Cardeno (born at Pavia, 1501, and died at Rome, 1576) fill not less than ten folio volumes. From a physical point of view the most remarkable of these is his *Opus Novum*, Basil, 1570, although, in general, it contains but little that is new. He speaks therein of the necessity of taking account of the resistance of the medium if one would determine the velocity of movement of a projectile. He furthermore endeavors to apply the beating of the pulse as a means of measuring time. In this way he measured the velocity of the wind, and found that the strongest storm wind blew at the rate of only fifty paces for one pulsation. * * * He also determined the densities of certain bodies, partly by the phenomenon of friction and partly by their resistance to projectiles, and found, for instance, that the air is fifty times lighter than water, a result which he himself, however, considered as inaccurate.

On page 743 Poggendorff says:

The oldest datum as to the velocity of the wind is that which Marriott gives in his treatise on the Movement of Water and Other Fluids (published after his death at Paris, 1686). Therein he states the velocity of the strongest winds at 32 feet per second. But since this velocity is much too small, and he does not state how he found it, therefore it is possible that this figure results from an estimate merely.

Passing over the history of the invention of several forms of anemometers, Poggendorff says:

There are few subjects in physics to whose measurement so many and various instruments have been devised as the strength of the wind. Most of these, however, have been no sooner invented than they were again quickly forgotten. The number of useful measurements of the velocity of the wind is very small and has no relation to the number of anemometers invented. As the oldest of these measurements we must recognize those of the Englishman, Derham. They were made in the year 1705 and published in the Philosophical Transactions in 1708. From the velocity with which the wind carries light objects, such as down, he concluded that a storm wind had a velocity of 50 to 60 English miles per hour, which is evidently too small. Rochow observed 120 English miles, or 24 German miles, as the velocity of a hurricane. (See the Philosophical Transactions, abridged, Vol. V, p. 392.) To this Derham, also, must credit be given in that he first, in the abovementioned Philosophical Transactions, demonstrated the influence of the wind on the velocity of sound, an influence that the Academy del Cimento denied, and whose demonstration certainly demanded better means of observation than the academy possessed, since the velocity of sound is very great relative to that of the wind.

DERHAM'S OBSERVATIONS ON THE VELOCITY OF THE WIND.

In the London Philosophical Transactions for 1708, Vol. XXVI, occurs the celebrated memoir by Rev. W. Derham on the Motion of Sound. This memoir was written and published in Latin, as being the common language of the philosophers of that day, but about 1875 the late Dr. J. C. Welling, of Washington, had occasion to make a translation of this memoir and allowed the present Editor to have a copy made for preservation in the Library of the Weather Bureau. The determination of the true velocity of sound required Dr. Derham to determine the influence, if any, of the velocity of the wind, about which there was some doubt at that time, in the minds of philosophers. As his determinations of the velocity of the wind have a special interest for meteorologists, and as Derham's whole memoir is an elegant example of experimental work, the Editor takes pleasure in laying before the readers of the REVIEW, the following quotation from the latter part of Dr. Welling's translation, which is fuller than the authorized Hutton's Abridgment:

After, in this way, I had perceived what influence the winds have, both for accelerating and retarding the course of sounds, curiosity led me to inquire into the velocity of the winds themselves. And though the inquiry may be foreign to my subject it will not be wholly ungrateful, as I hope, to curious minds, if I publish in this connection certain observations on this point.

Concerning the velocity of winds.—In order to ascertain how large a space winds may traverse in any given time, I have used, in prosecuting my experiments, certain bodies of the somewhat lighter sort, such as thistle down, light feathers, etc., which seemed better to serve my purpose than the instrument which is described for us in the Philosophical Transactions, No. 24; or even that other more available one, recalling the figure of a mill with wings attached, invented, unless I mistake, by our most acute friend, the late Dr. Hook.

From very many experiments which I have made, with the aid of the lighter sort of bodies, when the winds were blowing with differ-

ent degrees of force, I have found that the most violent wind traverses scarcely 60 miles an hour. For example, on the 11th of August, 1705, the violence of the wind excited such a tempest that it almost overturned the windmill itself near the spot where I made my observations. [The different degrees of the force of the winds, as has just been seen, I have for the most part noted by these figures: 0, 1, 2, 3, 4, 5, 6, up to 10, 15, or still higher degrees.] Now I have estimated that the force of the above indicated wind answers to about 12 or 14 of these degrees. And from very many reiterated experiments I have concluded that that tornado traversed about 33 feet in a half second, or 45 miles in an hour; hence I gather that the fleetest and most tempestuous winds (that violent wind which raged in the month of November, 1703, not being excepted) do not traverse more than 50 or 60 miles an hour.

After we have measured the velocity of the rapid winds, it is not difficult to conjecture what may be the velocity of less rapid ones; for I have also marked the course of these, and from various experiments I have convinced myself that some of them accomplished 15, some 13, others many less miles per hour; while some are propagated with such a slow motion that they move scarcely a single mile an hour. Moreover, other winds are so sluggish that one may easily outstrip them while making a journey on horseback or on foot. This fact is apparent to our senses, for when we arrest our steps we perceive a soft breeze gently fanning us, but if we advance with it we feel none at all; while if we quicken our pace instead of a breeze accompanying us and blowing in the same direction with our movement, we plainly feel the air resisting us, and blowing full in our faces. Likewise when the atmosphere is entirely quiescent and stagnant, if we chance to be walking or riding on horseback, we then perceive a gentle breeze pressing against us, with such degrees of force, in fact, as correspond to the rates of our own motion. And a breeze of wind or current of air is borne with the same rate of motion or velocity when it presses against us with an equal impetus as we stand still, or linger in our track.

From these observations about the velocity of winds very many things, not without utility, might be noted, but especially might we assign in view of them, one reason why the mercury rises and falls for such a long time before clear weather or rain sets in.

But I will omit these considerations as being foreign to my purpose, and this only will I observe as to sounds, to wit, that while their motion is accelerated by wind it is plain that those parts of the atmosphere by which sounds are impressed or propagated are not the same as those from which winds are blown, but certain other more ethereal and volatile parts, as one may suppose. For the fleetest winds do not pass through more than 60 miles in an hour, but sounds travel more than seven hundred thousand paces, or 778 miles in the same time.

But if it be objected that winds do accelerate or retard sounds it is to be answered that this does not only proceed from the current or tendency of the windy particles alone, but rather from the conjoint and cooperating motion of all the particles of the atmosphere, both the thicker and the ethereal. If the direction of this course or motion favors the waves of sound it is altogether in accordance with probability that the impulse of sounds should be accelerated by this cause, but if the direction is adverse that, the impulse should be retarded.

Having shown that the velocity of sound under ordinary conditions of the atmosphere in England averages 1,142 feet per second, Derham enumerates many practical applications of this knowledge, and concludes: "Finally, in this way the height of thunderclouds and the distance of the thunder and lightning itself may be easily ascertained."

THE CHINOOK IN OREGON.

The morning map of Thursday, December 3, at Portland, Oreg., contains the following predictions by B. S. Pague, Local Forecast Official:

Chinook winds are prevailing over Washington, Oregon, Idaho, and Montana this morning. The temperature is from 46° to 50°, west of the Cascades, and from 24° to 22° to the east of them.

The storm area extends from the ocean off northwestern Washington over British Columbia and northern Washington. An area of high pressure is central about Salt Lake, and the flow of air from the high to the low causes the chinook winds by dynamic heating.

Chinook winds are not warm winds from the ocean, but air made warm by the compression produced by the flow from the mountain heights of Nevada, Utah, and southern Idaho, to the lower lands extending north-northeastward and northwestward to the area of low barometric pressure. The map this morning shows the distribution of atmospheric pressure necessary to produce chinook winds over the northwestern portions of the United States. These winds are most welcome for they will clear the snow blockades which have closed the railroads and will remove the snow from the stock ranges.

Warm chinook weather will prevail for the next thirty-six hours.

The chinook prevailing this (Thursday) morning was indicated in the Tuesday morning's report, and was telegraphed out Wednesday morning.

In the above paragraph Mr. Pague has used the word chinook in its ordinary meteorological acceptation. It would be interesting to learn whether the popular usage in Oregon, Washington, and British Columbia agrees with that of the meteorologist.

MEXICAN CLIMATOLOGICAL DATA.

In order to extend the isobars and isotherms southward so that the students of weather, climate and storms in the United States may properly appreciate the influence of the conditions that prevail over Mexico the Editor has translated the following tables from the current numbers of the *Boletin Mensual* as published by the Central Meteorological Observatory of Mexico. The data there given in metric measures have been converted into English measures. The barometric means are as given by mercurial barometers under the influence of local gravity, and therefore need reductions to standard gravity, depending upon both latitude and altitude; the influence of the latter is rather uncertain, but that of the former is well known. For the sake of conformity with the other data published in this REVIEW these corrections for local gravity have not been applied. One additional station, Topolobampo, is published at the end of Table II.

Mexican data for November, 1896.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Campeche	......	......	......	......	......	......	......	......	......
Colima (Seminario)	1,600	28.26	90.5	57.7	76.3	70	0.39	wsw.	s. & w.
Colima	......	......	......	......	77.7	......	......	......	......
Guadalajara (O. d. E.)	5,141	25.00	77.7	39.4	64.8	80	3.44	se.	w. & nw.
Guanajuato	6,761	23.70	79.2	49.3	62.2	58	1.44	ene.	sw.
Jalapa	4,757	25.56	83.5	43.0	66.0	84	5.21	n.	......
Lagos	6,275	24.17	77.9	39.0	60.3	66	1.70	nw.	nw.
Leon	5,901	24.32	78.3	43.9	61.7	62	1.06	ssw.	w.
Magdalena (Sonora)	......	......	......	......	64.2	......	0.28	ne.	n.
Mazatlan	25	29.91	84.6	62.1	76.6	77	0.00	nw.	sw.
Merida	50	29.92	94.3	67.6	78.1	81	4.62	ne.	e.
Mexico (Obs. Cent.)	7,489	23.09	72.0	47.3	58.5	68	0.80	nw.	ne.
Mexico (E. N. de S.)	7,480	......	......	......	......	......	......	......	......
Morelia (Seminario)	6,401	23.98	75.2	46.9	58.5	73	1.31	ssw.	w.
Oaxaca	5,164	25.08	84.7	49.1	67.3	65	2.93	nnw.	ne.
Pabellon	6,312	......	......	......	......	......	......	......	......
Pachuca	7,956	22.55	78.4	39.2	55.9	73	0.40	ne.	ne.
Puebla (Col. d. Est)	7,118	......	......	......	......	......	......	......	......
Puebla (Col. Cat.)	7,112	23.38	76.1	48.2	61.3	66	1.61	e.	ne.
Queretaro	6,070	......	......	......	......	......	......	......	......
Saltillo (Col. S. Juan)	5,377	24.93	77.5	24.4	58.6	77	2.40	n.	n.
San Luis Potosi	6,202	24.16	74.3	40.1	61.7	67	1.28	e.	w.
Silao	6,063	24.30	73.8	50.7	64.6	69	0.72	w. & nw.	w.
Tacámbaro	......	......	......	......	......	......	......	......	......
Tacubaya (Obs. Nac.)	7,620	......	......	......	......	......	......	......	......
Tampico (Hos. Mil.)	38	......	......	......	......	......	......	......	......
Tehuacan	5,453	......	......	......	......	......	......	......	......
Toluca	8,612	21.91	70.2	38.8	52.5	76	1.34	w.	......
Trejo (Hac. Sil., Gto.)	6,011	......	......	......	......	......	0.91	......	......
Veracruz	48	30.02	86.9	61.0	75.4	77	9.84	nne.	nne.
Zacatecas	8,015	22.54	76.6	26.6	57.0	67	0.43	sw.	sw.
Zapotlan (Seminario)	5,125	......	......	......	......	......	......	......	......

In order that there may be no doubt as to the altitudes of the barometers at these Mexican stations, the Editor has solicited some information from Professor Bárcena, as mentioned on page 421 of the previous number of the REVIEW, and takes pleasure in publishing the following reply:

CENTRAL METEOROLOGIC-MAGNETIC OBSERVATORY,

Mexico, January 15, 1897.

Prof. CLEVELAND ABBE,

Weather Bureau, Washington, D. C.

DEAR SIR: In the absence of Prof. Mariano Bárcena, Director of this Bureau, I have the honor to answer your letter of January 6.

All the elevations of the table are accurately determined and the barometers are in the best possible condition. The altitudes given those of the cisterns of the barometers. In Mexico this altitude is 17.5 meters above the ground; in Puebla, 15.0; in Mazatlan, 7.5; in Merida, 8.5; in other localities the barometers are a very few meters

above the ground. The altitude of Colima is in error; the only good one is 488 meters, or 1,600 feet.*

I have the honor to be truly yours,

(Signed) J. ZENDEJAS,
Vice Director.

[* We, therefore, retain the figures 487.7 meters, or 1,600 feet given in the *Boletin Mensual* for June and November, 1896, and request the reader to make the necessary changes on pages 14, 44, 123, 206, 290, 374, 421.—ED.]

PRODUCTION OF RAIN BY GREAT FIRES.

In the early part of the century Professor Espy excited great interest by his lectures on the formation of clouds, rain, and storms, and several, but not many, instances were quoted in which fires in the forest or canebrake were known to have actually produced local rains. An experiment made by Espy, near Washington, was not successful, and, indeed, it is conceded that a very moist condition, or a generally unstable condition of the air, is needed in order to produce a favorable result. It will, perhaps, be of interest to find that attention had been called to this matter before Espy's time. Thus, in the London Philosophical Transactions for 1708 (see Hutton's Abridgment, Vol. V, p. 403) the Archbishop of Dublin says:

There are three ways of reducing heath and bog to arable land (in the counties of Londonderry and Donegal): the first is by cutting off the scurf of the ground, making up the earth so cut in heaps, and when the sun has dried them setting them on fire; when burnt as much as they can be the heaps are scattered on the ground, and, after plowing it produces barley, rye, or oats, for about three years. The inconveniences of this method are (1) that the burning defiles the air, causes rain and wind, and is not practicable in a wet summer. * * *

It may be of historical interest to collect other references to the connection between large fires and subsequent rainfall.

INTERNATIONAL CLOUD OBSERVATIONS.

It is well known that, under the auspices of a special international committee, the principal weather bureaus of the world are now making a systematic effort to improve our knowledge of the altitudes and motions of the clouds. From a recent letter to the cloud committee we learn that the stations occupied in North America are as follows:

CANADA.—Toronto, where the altitudes are determined by triangulation.

THE UNITED STATES.—Blue Hill, Mass. (*i. e*, the observatory of Mr. A. L. Rotch), where the altitudes of the clouds are determined by triangulation, and the movements by the nephoscope; the United States Weather Bureau, Washington, D. C., where triangulation and the nephoscope are both employed; in addition to this central station, simple nephoscope observations are made at other Weather Bureau stations as follows: Baker City, Oreg.; St. Paul, Minn.; Kansas City, Mo.; Abilene, Tex.; Vicksburg, Miss.; Louisville, Ky.; Key West, Fla.; Cleveland, Ohio; Detroit, Mich.; Buffalo, N. Y.; also a short series by the voluntary observer, Frank W. Proctor, Waynesville, N. C.

At Washington the exact heights of the clouds and the directions and velocities of their motions are computed from observations of altitude and azimuth made simultaneously by two observers stationed at points about 4,465 feet apart. No attempt has been made to employ any photographic methods. The observers are instructed to confine their attention to a space that is 15° from the base line and from the horizon. Within this space simple trigonometrical formulæ are applied after rejecting the observations that do not conform to obvious criteria. The settings are made at intervals of two minutes and in pairs, if possible; single readings are avoided when practicable. This method fails when applied to stratus formations, except fracto-stratus, but the main problem of the American atmospheric circulation does not suffer in its solution on that account. When weather permits three series of ten settings each are taken daily, and the total will be sufficient to discuss the problem on the different levels with accuracy. It is not expected that any more stations for special cloud observations will be established by the Weather Bureau during the coming year.

RIPPLE CLOUDS OF ALTO-CUMULI.

Mr. Frank W. Proctor communicates the following observations on alto-cumuli clouds, made at Waynesville, among the mountains of North Carolina, and which were at that time thought by him to be of interest in connection with the formation of ripple clouds. The observations were made by means of the nephoscope, in accordance with the scheme now being carried out at a number of Weather Bureau stations:

Alto-cumuli clouds observed at Waynesville, N. C., July 28, 1896.

Local mean time, a. m.	Seen in azimuth.	Angular elevation.	Azimuth of motion.	Velocity, apparent.		Velocity computed for altitude of 1 mile.		Velocity computed for altitude of 1,000 meters.		Direction of motion.
				Millimeters.	Seconds.	Meters per second.	Miles per hour.	Meters per second.	Miles per hour.	
h. m.	°	°	°							
8 55	2	74	115	7.0	25	3.7	8.4	2.33	5.2	ene.
59	20	51	115	7.0	25	3.7	8.4	2.33	5.2	ene.
9 05	338	68	115	6.0	25	3.2	7.2	2.00	4.5	ene.
08	219	72	115	6.2	25	3.3	7.4	2.07	4.6	ene.
12	304	73	98	6.2	25	3.3	7.4	2.07	4.6	e. by n.
14	325	72	94	6.2	25	3.3	7.4	2.07	4.6	e.
17	198	83	94	5.7	25	3.0	6.8	1.90	4.3	e.

This cloud formation is a dense, white, opaque sheet, made by individual alto-cumuli of considerable size, in close contact and overlapping. Toward the edge of the formation the individual alto-cumuli are smaller and farther apart and, it is believed, somewhat higher. Observations 1, 2, 3, and 4 were made on the bottom of the mass, near its center; Nos. 5, 6, and 7 were made on the smaller cumuli on the edges, none of which were in contact. It is believed that these observations give very closely the azimuth of motion of the air currents at the top and at the bottom of this cloud mass, viz: top, 96°; bottom, 115°.

[In connection with these interesting observations by Mr. Proctor, the Editor takes the liberty of remarking that it is not apparent that the observations of velocity can be made with sufficient accuracy, or that the edges of the clouds can be seen with sufficient distinctness to warrant the hope that we can determine the relative velocity of the upper and lower surface of a thin sheet of alto-cumulus ripples. For instance, the lower surface of the clouds here observed must have had an altitude of at least 2,000 feet above the observer, while the upper surface may have been 2,500 feet, therefore, the same actual velocity at the top and bottom would give apparent velocities a little greater for the lower surface in the ratio of 2,000 to 2,500, or the angular velocity of the upper surface would be four-fifths of that of the lower surface; this ratio would, of course, vary with the actual height and thickness of the cloud layer. Mr. Proctor's observations, above given, seem to show some such relation as this, and it would require many observations of great accuracy to establish the fact that the upper surface has an actual motion of progression either greater or less than the lower surface. And yet one can not doubt but that this often happens; in the case of tall cumuli, such differences are apparent to the nephoscope but for shallow layers of alto-cumulus the fact could best be established either by the trigonometrical or the photographic methods of cloud observation. As the observations quoted by Mr. Proctor were all within 40° of the zenith, it is quite plausible that the first four observations differed from the last three both in the direction and velocity of motion, not because they related to points at the top and bottom of the stratum, but to points near the center and the edges of the field or sheet of alto-cumuli.—ED.]

THE INTERNATIONAL COMMITTEE ON AERONAUTICS.

In connection with the report of the proceedings of the recent Meteorological Conference at Paris (see October REVIEW, pages 365-367), Mr. A. Lawrence Rotch desires us to say that the Aeronautical Committee appointed by the International Meteorological Committee, consisted of Messrs. Assmann, Erk, de Fonvielle, Hergesell, Hermite, Pomortzeff, and Rotch, and has recently been enlarged by the addition of Messrs. Andrée, Berson, Cailletet, and Jaubert. M. Hergesell has been named President, and M. de Fonvielle, Secretary.

CONSTANTS AND UNITS USED IN METEOROLOGY.

During the past two centuries the progress of the physical sciences, and especially meteorology, has been appreciably hindered by the wide-spread diversity of usage as to the units or standards of measurement. Each nation and sovereign, and even the smallest states, as also different classes of merchants and artisans, have, from time to time, introduced new standards; many of those in use date back to unknown epochs in the history of civilization. During the past fifty years a strong effort has been made, with steadily increasing success, to facilitate our progress by the rejection of minor units and by the general adoption of the metric system. At the present time meteorology is the only branch of science which has officially recognized the fact that absolute uniformity of usage is not at present attainable, but that the choice may at least be restricted to either the metric or the English system. A vote to this effect was taken at the International Meteorological Conference in Rome in 1879; since that date the meteorological world has awaited with great interest the results of the authoritative comparisons between the English and metric standards that have been undertaken by the International Bureau of Weights and Measures. This latter bureau has its laboratories and workshops at Sevres (Pavillon de Breteuil), near Paris, and its expenses are defrayed by many nations, each of which bears its own proper proportion. Pending the final conclusions of this important international bureau the meteorologists assembled in their successive international conferences have adopted and recommended the tables prepared by their own committee, Messrs. E. Mascart and H. Wild, which were published in 1890 in a large quarto volume. Since that date these tables have undoubtedly been accepted everywhere as the authoritative standard for the use of meteorologists. In two respects only (the hygrometric tables and those for the reduction of the barometer to sea level) do the distinguished authors state that serious difficulties were experienced in their efforts to realize a high degree of accuracy and authoritative uniformity.

Although these international tables must for some time to come continue to be our authority, yet the time will undoubtedly arrive when a new edition will be authorized by the permanent meteorological committee or the International Congress, which it represents. It will, therefore, be of interest to consider the present state of our knowledge of the values of the units and constants that are important to meteorology and the relation of the English and metric systems of measurement.

(1.) With regard to thermometry, which is a fundamental consideration in all measurements, the International Bureau has definitely abandoned the mercurial thermometer, considered as a normal, and has adopted instead the hydrogen thermometer. With this normal any mercurial may be compared, so that by using a special method of manipulation and a proper system of corrections we may deduce normal temperatures from mercurial thermometers. It has been the practice of the United States Weather Bureau since 1881 to use the air-glass thermometer and await a final determination of the small outstanding reductions to the normal scale of the International Bureau.

(2.) With regard to the ratio between the meter and the yard a recent report (September, 1896) by the president of the International Bureau calls attention to the fact that, in order that there may be no doubt about the temperature (62° F.) at which the imperial standard yard preserved at London has its legal standard length, the bureau assumes that this is measured, not on the normal mercurial thermometer, as heretofore, but on the normal scale adopted by that bureau. Under this assumption, it follows that the relation between the normal lengths of these two standards is such that one yard equals 0.91439916 meters. Owing to the many difficulties inherent to this comparison, especially due to the differences in length and temperature of the two normals, the president of the International Bureau states that some doubt may still remain with regard to the last two figures, and he recommends adopting 0.9143992. From this ratio, it follows that one meter is equal to 1.0936143 yards, or 3.2808429 feet, or 39.370113 inches. The provisional value adopted by the International Meteorological Tables is Kater's value, viz: one meter equals 39.37079 inches, or 1.09363306 yards, whence one yard equals 0.91438348 meter. This latter value was also adopted by the United States Weather Bureau in 1875 in reduction tables compiled by the Editor for the preparation of its Bulletin of International Simultaneous Meteorological Observations.

(3.) With regard to the ratio between the pound and the kilogram, a recent edition of the circular and tables of the United States Coast and Geodetic Survey, published in July, 1893, adopts the following: one kilogram equals 15432.35639 grains Troy, or 2.204622627 pounds avoirdupois, whence one pound avoirdupois equals 453.5924277 grams and one grain Troy equals 0.06479891824 gram. In a recent letter to the Editor, Gen. W. W. Duffield, Superintendent of the United States Coast and Geodetic Survey, states that:

> This value for the pound in terms of the kilogram depends upon—
> (*A*) Comparisons made at the Standards Office, London, in 1874, between the platinum pound "S" and the Imperial Standard pound, "P. S."
> (*B*) The determination of the relation of the pound "S." to the international kilogram made at the International Bureau of Weights and Measures in 1883.
> The result of the comparison of the pounds with one another (see Ninth Annual Report of the Warden of the Standards, Appendix IV) gave "S" = "P. S." —0.01664 grain, or "S" = 6999.98336 grains. The value of "S," resulting from the work done at the International Bureau of Weights and Measures (see *Travaux et Memoires*, Tome IV) was "S" equals 453.5913494 grams. The value of "P. S." is, therefore, 453.5913494 grams plus 0.01664 grain or 0.0010783 gram, equals 453.5924277 grams.
> After the return of the pound "S" to London from the International Bureau of Weights and Measures, a re-comparison of it with "P. S." was undertaken by Mr. Chaney, Superintendent of Weights and Measures, but the result of this comparison was not used, although it differed slightly from that of 1874.

The value of the ratio of the pound to the kilogram adopted in the International Meteorological Tables was deduced from nearly the same data, by a slightly different combination of measurements, with the following results: one kilogram equals 15432.350 grains Troy, whence one grain Troy equals 0.06479894 gram.

This ratio enters into theoretical meteorology in the value of the weight of a unit volume of air, it would also enter into our every day work if we should adopt the most rational method of expressing atmospheric pressure, viz, in pounds to the square foot or kilograms to the square meter instead of using the apparent barometric pressure without regard to the force of gravity.

(4.) The weight of a liter of pure dry air, containing the average amount of carbonic acid gas, at 0° C., and the pressure of 760 millimeters of mercury, under the force of gravity that prevails at sea level and latitude 45°, was computed by the International Bureau of Weights and Measures at 1.293052

grams, which value is based essentially upon the measurements made by Regnault in the laboratory of the College de France, and this number is adopted in the International Meteorological Tables.

According to Professor Mendeleef, President of the Central Board of Weights and Measures for Russia, the average value arrived at by him is 0.00131844 × gravity, which, using Helmert's value, 980.597, for gravity at 45° and sea level, would give 1.29287 grams; but if we use Putnam's value, 980.630, we get 1.29291, with an uncertainty of 1 in the fourth decimal place (see Nature, March 7, 1895, Vol. LI, p. 452).

(5.) With regard to the force of gravity at any point on the earth's surface no authoritative discussion of the subject for the whole globe has as yet been published, neither by the International Bureau of Weights and Measures nor by the International Geodetic Association. In fact, although nearly a thousand stations have been occupied, yet Helmert, as president of the latter association, states (*Verhandlungen Allgemeinen Conferenz*, 1896) that the time has not yet arrived for a definitive decision, although the errors of the various formulæ, are well recognized. Mr. G. R. Putnam, of the United States Coast and Geodetic Survey states that—

The following formula represents the relative force of gravity, in dynes, at all American stations as far as yet observed, to within $\frac{1}{4000}$ part of g and at all stations except Pikes Peak and similar mountain stations to within $\frac{1}{8000}$:

$$g=978.066\left(1+0.005243\ \sin^2\phi-\frac{2H}{r}-P\right)$$

This formula retains the term $-\frac{2gH}{r}$ which expresses the diminution of gravity due to the elevation (H) above the sea level, by which quantity the distance of the pendulum from the center of the earth has been increased, but it rejects the term $+\frac{2gH}{r}\cdot\frac{3}{4}\frac{\delta}{\Delta}$ introduced by Bouguer to allow for the attraction of the mass of the stratum elevated above sea level, assuming the station to be located on a horizontal plain. The term $-P$ allows for the departure of the local topography from this latter assumption, and requires for its computation a knowledge of the topography of the neighborhood; it is practically inappreciable at most points, its maximum effect at any of the stations occupied within the United States is $\frac{1}{20000}$ of g (at Pikes Peak); it would, necessarily, be omitted in barometric tables. Another correction suggested by Faye, and depending on the relation of the station to the average elevation of the surrounding region, was tentatively employed by Mr. Putnam (Coast and Geodetic Survey, Report 1894, App. I, pp. 25–27), and was found to give a more satisfactory agreement between observed and computed values of gravity. With it the largest discrepancy in the American stations diminished to $\frac{1}{13000}$, and the discrepancy at Pikes Peak almost entirely disappeared. Its application also requires a knowledge of the surrounding topography, and it would necessarily be omitted in barometric tables. The absolute term, 978.066, in the above formula must be considered uncertain by about $\frac{1}{10000}$ part, due to uncertainties in the measurement of the absolute force of gravity; it agrees closely, however, with the mean of the best determinations made throughout the world, and differs by only about the $\frac{1}{25000}$ part at Washington, from the value deduced by Helmert from a general combination of pendulum observations.

Mr. Putnam states, as indeed can be seen from the tabular data given in the above-mentioned memoir, that there is every reason to believe that the simple formula of two terms

$$978.066\left(1+0.005243\ \sin^2\varphi-\frac{2}{r}H\right)$$

or Helmert's formula of 1884 in his Higher Geodesy, Vol. II,

$$g=978.000\left(1+0.005310\ \sin^2\varphi-\frac{2H}{r}\right)$$

omitting the topographic term, will represent the force of gravity at American stations to within $\frac{1}{4000}$ part of its value. Whenever the altitude of a station is determined by accurate leveling, the local force of gravity should be determined at the same time, otherwise we lose the advantage of accuracy of altitude.

As an illustration of the application of all three terms of the above formula the following examples are given:

	Pikes Peak dynes.	Salt Lake City dynes.
Gravity constant	978.066	978.066
Correction for latitude	+ 2.017	+ 2.188
Corrected	980.083	980.254
Correction for altitude	− 1.321	− 0.407
Corrected	978.762	979.847
Correction for topography	− 0.048	− 0.004
Computed local gravity	978.714	979.843
Observed local gravity	978.940	979.789
Observed minus computed	+ 0.226	− 0.054

Instead of $\sin^2\varphi$, the equivalent expression $\frac{1}{2}(1-\cos 2\varphi)$ is frequently preferred. Therefore, for this case, Mr. Putnam's formula may be written

$$980.630\left(1-0.0026146\cos 2\varphi-\frac{2H}{1.0026215\,r}-\frac{P}{1.0026}\right)$$

where the average radius may ordinarily be used for r, in which case the factor of H in meters becomes

$$\frac{2}{1.0026215}\times\frac{1}{6370191}=\frac{1}{3193445}$$

similarly Helmert's formula becomes

$$980.597\left(1-0.002648\cos 2\varphi-\frac{2H}{1.002655\,r}\right)$$

The value of gravity as given in the International Meteorological Tables, is computed by the formula adopted by Broch for the use of the International Bureau of Weights and Measures; it retains the term introduced by Bouguer, but assumes that the density of the elevated plateau is one-half that of the earth, whence the expression $\frac{2gH}{r}\left(1-\frac{3}{4}\cdot\frac{\delta}{\Delta}\right)$ becomes $\frac{2gH}{r}\left(1-\frac{3}{8}\right)=\frac{5}{4}\cdot\frac{gH}{r}$, so that Broch's final formula, when H is given in meters, reads—

$$g=g_{45}\,(1-0.00259\cos 2\varphi)\left(1-\frac{5}{4}\cdot\frac{H}{6370000}\right)$$

This expression for gravity appears in the geodetic section (p. A 13), and again, of course, in the barometric section (p. A 33 and A 35) of the international tables. It is evident that such computed values of gravity do not always possess the accuracy that is desired in barometric work, and that it will be best, whenever possible, to determine the value by direct observation which can easily be done by the improved methods of the United States Coast and Geodetic Survey.

The further diminution of gravity, with ascent into the atmosphere above the earth's surface, follows the simple law of the inverse square of the distance from the earth's center and its effect upon the weight of the air above us, and, therefore, upon our barometric observations, can easily be determined. In order to compute the value of gravity at the height z above the station, whose elevation is H, it suffices to add another factor $\left(1-\frac{2z}{r+H}\right)$ to either of the above formulæ.

(6.) With regard to the radius of the earth, Mr. O. H. Tittmann states that the Coast and Geodetic Survey has for many years used the so-called Clarke's spheroid, as best adapted to the development of its existing triangulation, but in the present state of our knowledge, and for a general representation of the earth's figure, there is really nothing gained by departing from Bessel's spheroid, viz: Radius, geocentric, major,

6,377,397 meters, or 20,923,597 feet; radius, geocentric, minor, 6,356,079 meters, or 20,853,654 feet; radius, geocentric, at 45° latitude, 6,366,787; radius of a sphere of equivalent surface, 6,370,191. The latter is the radius most generally appropriate for computing or charting meteorological data. The length of the quadrant from the pole to the equator of Bessel's spheroid is 10,000,856 meters. The probable uncertainty still attaching to the above values of the major and minor radii is about 500 meters, or $\frac{1}{13000}$ part of the whole.

The radii adopted in the geodetic section of the International Meteorological Tables are those of Bessel's spheroid, as above, but the approximate value, 6,370,000 meters, is adopted on page A 13 for the computation of gravity, and the value, 6,371,104, on page A 37, in the computation of the barometric constant, and the same value is again introduced, on pages A 40, A 41, A 45, in the computation of the gravity term of the barometric formula; these slight variations are often unimportant, but the larger value, $1.0026215 \times 6,370,191 = 6,386,891$, is preferable, as shown by the preceding computation.

NECROLOGY.

The following, by Mariano Bárcena, Director of the Central Meteorological Observatory, is quoted from the *Boletin Mensual* for November, 1896:

On the 28th of last October Don Miguel Perez, Engineer and Subdirector of the Central Meteorological Observatory, died in the city of Coyoacan, the victim of a painful malady caused by his devotion to study and his assiduity in the performance of his duties.

Senor Perez was born in the city of Mexico on the 28th of September, 1847. His studies of civil engineering and architecture were made in the Academy of San Carlos and in the School of Engineering of Mexico. He was always distinguished for his brilliant progress, and obtained various prizes in his studies. He was one of the founders of the Central Meteorological Observatory, in the year 1877, and occupied the position of second observer, and a short time after that of subdirector of this institution, the duties of which he always discharged with the greatest ability. In addition to these he made numerous and very important physical and meteorological studies. He was professor in the Academy of Fine Arts in Mexico, and also in the engineering and military schools, where he occupied the chairs of Calculus of Probabilities and Cosmography. In the National Preparatory School he served for a long time as master of the preparatory classes of physics. He was a member of the Mexican societies of natural history, mining, geography, and statistics; the scientific society, Antonio Alzate; honorary member of medical fraternity of Guadalajara and of that of the engineers of Jalisco; Fellow by Merit of the Iberian-American Union of Madrid; corresponding member of the Scientific Association of Brussels and of the Royal Academy of Exact Sciences, Physical and Natural of Madrid; regular member and pro-secretary of the Academy of Mexico and correspondent of the Royal Spanish Academy.

Besides the observations and compilations made by Senor Perez during his long employment at the Observatory, he wrote numerous memoirs and assisted in many special works such as: Annuals of national and international comparative meteorology; Annual Meteorological Charts; Barometric Tables; Bulletin of the Central Meteorological Observatory; Mexican Carpology and many other publications. He was one of the editors of several scientific periodicals, such as: The Industrial Promoter; The Mexican Miner; The Bulletin of the Ministry of the Interior and was one of the group of founders and editors of the Scientific Mexican Review.

Mexican science has lost in Senor Perez one of its most distinguished and intelligent votaries and the personnel of the Central Meteorological Observatory mourns the early death of one of its most industrious and intelligent colleagues and an excellent friend.

The death of Senor Perez has also called forth from Senor Ángel Anguiano, the Director of the National Astronomical Observatory at Tacubaya, an eloquent tribute, signed by his first assistant, Senor Felipe Valle, which we reproduce from the *Anuario*, in memory of this distinguished Mexican meteorologist and engineer:

On October 28, 1896, the Central Meteorological Observatory of Mexico sustained a great loss by the death of its Subdirector, Don Miguel Perez, Engineer, who ever since the establishment of this institution has devoted his brilliant intellect and his indomitable perseverance to the development and advancement of meteorology in Mexico.

The works that he has produced are his best eulogy, and they bear testimony to his intelligent labor during the four lustrums consecrated by him to the study of meteorology. All that we might say in his praise would be feeble in consideration of his eminent merits.

He was distinguished not only as meteorologist but as a professor in the military and engineering schools, where he was a model in his conscientious fulfillment of the duties imposed upon him by his superiors.

As sincere friends of the lamented engineer, whose painful loss we greatly deplore, intimately acquainted with his scientific acquirements and his private virtues, with his noble enthusiasm for all that could benefit the country, and recognizing his skill as an assistant in many undertakings accomplished by this observatory, we, of the Astronomical Observatory, with our whole hearts join in the grief of the Meteorological Observatory and announce to the readers of our *Annuaire* the irreparable loss which science in Mexico has sustained by his death.

Messrs. Rafael J. Sanchez and Ricardo Adan Funes, assistants at the Meteorological and Astronomical Observatory of San Salvador, under date of October 31, 1896, announce:

On the 25th of this present month there died in this city, the worthy director of the Observatory and distinguished mathematician, Doctor Alberto Sanchez.

Society in general deeply mourns this irreparable loss, but it is felt more particularly by this Institution which owes to the indefatigable Dr. Sanchez the state of progress which it has attained under his administration.

The following is quoted from an announcement of November 10 by Julian Aparicio, Director of the Meteorological and Astronomical Observatory of San Salvador:

I have the honor to inform you that on the 3d of the current month I was appointed director of the National Observatory in consequence of the irreparable loss we have sustained in the death of the illustrious mathematician, Doctor Don Alberto Sanchez.

METEOROLOGICAL TABLES.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

Table I gives, for about 130 Weather Bureau stations making two observations daily and for about 20 others making only the 8 p. m. observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation.

Table II gives, for about 2,400 stations occupied by voluntary observers, the extreme maximum and minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station; the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (. . . .).

Table III gives, for about 30 Canadian stations, the mean pressure, mean temperature, total precipitation, prevailing wind, and the respective departures from normal values.

Reports from Newfoundland and Bermuda are included in this table for convenience of tabulation.

Table IV gives detailed observations at Honolulu, Republic of Hawaii, by Curtis J. Lyons, meteorologist to the Government Survey.

Table V gives, for 26 stations, the mean hourly temperatures deduced from thermographs of the pattern described and figured in the Report of the Chief of the Weather Bureau, 1891–'92, p. 29.

Table VI gives, for 26 stations, the mean hourly pressures as automatically registered by Richard barographs, except for Washington, D. C., where Foreman's barograph is in use. Both instruments are described in the Report of the Chief of the Weather Bureau, 1891–'92, pp. 26 and 30.

Table VII gives, for about 130 stations, the arithmetical means of the hourly movements of the wind ending with the respective hours, as registered automatically by the Robinson anemometer, in conjunction with an electrical recording mechanism, described and illustrated in the Report of the Chief of the Weather Bureau, 1891–'92, p. 19.

Table VIII gives the danger points, the highest, lowest, and mean stages of water in the rivers at cities and towns on the principal rivers; also the distance of the station from the river mouth along the river channel.

Table IX gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind. The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division one may obtain the average resultant direction for that division.

Table X gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table XI gives, for 38 stations, the percentages of hourly sunshine as derived from the automatic records made by two essentially different types of instruments, designated, respectively, the thermometric recorder and the photographic recorder. The kind of instrument used at each station is indicated in the table by the letter T or P in the column following the name of the station.

Table XII gives a record of the heaviest rainfalls for periods of five and ten minutes and one hour, as reported by regular stations of the Weather Bureau furnished with self-registering rain gauges.

Table XIII gives the record of excessive precipitation at all stations from which reports are received.

Additional information concerning the tables will be found in the REVIEW for January, 1895.

NOTES EXPLANATORY OF THE CHARTS.

Chart I.—Tracks of centers of low pressure. The roman letters show number and order of centers of low areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the lowest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a trough or long oval area of low pressure.

Chart II.—Tracks of centers of high pressure. The roman letters show number and order of centers of high areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the highest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a ridge of high pressure.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all, by 0.0.

Chart IV.—Sea-level isobars, surface isotherms, and resultant winds. The wind directions on this Chart are the computed resultants of observations at 8 a. m. and 8 p, m., daily; the resultant duration is shown by figures attached to each arrow. The temperatures are the means of daily maxima and minima and are not reduced to sea level. The pressures are the means of 8 a. m. and 8 p. m. observations, daily, and correspond to Professor Hazen's system of reduction; the barometer is not reduced to standard gravity, but the necessary reduction for 30 inches of the mercurial barometer is shown by the marginal figures for each degree of latitude.

Chart V.—Total snowfall, with the isotherms of mimimum 32° F., and minimum 40° F.

Chart VI.—Depth of snow on ground at the close of the month.

Table I.—*Climatological data for Weather Bureau Stations, December, 1896.*

Stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure in inches: Mean pressure, 8 a.m. and 8 p.m. +2.	Pressure in inches: Mean reduced.	Pressure in inches: Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. and min. +2.	Temperature: Departure from normal.	Temperature: Maximum.	Temperature: Date.	Temperature: Mean maximum.	Temperature: Minimum.	Temperature: Date.	Temperature: Mean minimum.	Temperature: Greatest daily range.	Humidity and precipitation: Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with .01, or more.	Wind: Total movement, miles.	Wind: Prevailing direction.	Maximum velocity: Miles per hour.	Maximum velocity: Direction.	Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Monthly temperature data since opening station: Absolute maximum.	Year.	Absolute minimum.	Year.
New England.						29.2	-2.8										2.18	-1.4														
Eastport	76	24	29.90	30.08	+.11	22.4	-4.9	48	13	30	-2	27	15	33	17	75	1.70	-2.3	6	10,333	w.	56	ne.	16	11	9	11	5.8	54	1877	-21	1884
Portland, Me	103	25	29.98	30.09	+.07	25.2	-2.4	47	6	33	3	27	18	27	16	70	2.18	-1.3	7	5,770	n.	32	n.	16	12	9	10	5.2	60	1889	-17	1872
Northfield	872	10	29.18	30.18	+.13	17.9	-3.7	50	6	27	-10	28	9	35	12	79	0.81	-2.3	6	6,277	n.	44	nw.	26	8	8	15	6.2	61	1895	-27	1893
Boston	125	27	30.00	30.14	+.09	30.4	-2.3	58	13	38	4	27	23	24	20	68	1.70	-1.8	4	9,347	sw.	40	n.	16	12	9	10	5.0	66	1881	-12	1883
Nantucket	14	11	30.11	30.12	+.06	35.1	0.0	54	9	40	14	25	30	21	30	83	2.68	-1.6	11	10,865	nw.	62	ne.	16	15	7	9	4.2	59	1895	6	1892
Woods Hole	...	19	...	...	...	32.6	-3.8	55	9	37	10	27	28	19	...	...	3.18	-0.3	6	13,867	sw.	54	ne.	16	19	6	6	3.3	58	*	-6	1875
Vineyard Haven	...	11	...	...	...	34.8	-2.6	57	13	42	10	27	28	24	...	...	3.08	+0.4	7	...	nw.	...	...	...	10	7	14	...	62	*	4	1892
Block Island	27	17	30.12	30.15	+.09	34.4	-2.8	54	13	39	11	24	30	24	27	73	2.55	-1.1	8	14,442	ne.	80	ne.	16	11	16	4	4.7	60	*	-3	1884
Narragansett Pier	...	15	...	...	...	29.9	-2.9	53	*	39	0	25	21	39	...	...	1.56	-2.4	6	...	n.	...	...	...	20	4	7	...	50	1884	-9	*
New Haven	107	24	30.04	30.16	+.07	29.4	-3.1	53	13	37	-2	28	22	32	30	69	2.40	-1.0	6	7,527	n.	42	n.	16	16	7	8	4.1	68	1889	-10	1884
Mid. Atlan. States.						35.5	-2.2										1.12	-2.1														
Albany	97	23	30.09	30.20	+.12	26.2	-4.1	50	6	33	-7	28	19	30	20	82	0.73	-2.0	3	6,046	s.	32	se.	4	6	13	12	6.3	66	1889	-17	1875
Binghamton	875	...	...	...	...	27.2	...	56	13	34	-7	28	20	37	...	...	0.77	...	10	4,708	w.	28	w.	19	4	7	20	7.4	...	...	...	...
New York	314	27	29.83	30.18	+.08	32.1	-3.7	55	13	39	5	24	26	20	24	74	1.70	-1.6	4	10,765	sw.	54	n.	16	13	8	10	4.9	68	1891	-6	1880
Harrisburg	377	9	29.80	30.22	+.06	33.0	-1.4	58	13	39	9	28	27	22	25	77	0.40	-2.6	5	5,328	w.	38	w.	9	9	8	14	5.9	66	1889	4	1894
Philadelphia	117	26	30.07	30.20	+.07	34.7	-1.1	60	7	41	12	24	28	21	25	68	1.00	-1.7	4	7,231	nw.	36	nw.	23	11	12	8	4.7	70	1873	-5	1880
Atlantic City	53	...	30.14	30.19	+.08	34.8	-2.0	59	7	42	10	24	28	25	28	77	0.85	-3.0	5	9,618	n.	48	ne.	15	15	10	6	4.0	...	...	...	...
Baltimore	123	26	30.08	30.21	+.07	36.4	-2.1	66	13	43	14	24	30	26	24	65	0.37	-2.8	5	3,342	w.	25	w.	9	4	14	13	6.6	73	1889	-3	1880
Washington	112	27	30.11	30.24	+.08	35.6	-2.2	66	7	44	12	28	27	34	24	67	0.30	-2.7	5	4,985	s.	34	nw.	9	12	8	11	4.7	73	1873	-13	1880
Cape Henry	...	23	...	...	...	41.7	-1.1	66	13	48	21	26	36	25	...	...	2.53	-1.6	5	...	nw.	...	...	...	7	9	15	...	76	1875	7	1880
Lynchburg	685	26	29.49	30.26	+.10	39.0	-0.9	65	7	49	18	25	29	36	27	70	0.13	-2.9	3	3,193	sw.	28	nw.	23	17	8	6	4.3	73	*	-5	1880
Norfolk	57	26	30.17	30.24	+.10	41.2	-3.0	65	7	49	20	24	34	28	32	77	3.21	-0.5	6	6,290	ne.	36	ne.	15	13	10	8	4.8	75	1891	6	1880
S. Atlantic States.						46.3	-3.1										3.77	+0.3														
Charlotte	773	19	29.39	30.24	+.07	41.6	-2.3	68	11	50	18	4	33	29	31	72	1.87	-2.2	6	5,060	ne.	26	s.	22	18	4	9	4.2	76	1889	-5	1880
Hatteras	11	17	30.19	30.20	+.06	46.1	-2.1	64	15	51	27	24	41	22	41	87	5.59	+0.1	8	11,606	n.	61	nw.	15	13	8	10	5.0	73	1894	8	1880
Kittyhawk †§	9	22	30.19	30.20	+.11	44.0	-1.1	64	13	52	22	26	36	24	38	81	4.33	+0.2	5	9,291	n.	60	ne.	2	14	5	8	4.3	73	*	8	1880
Raleigh	375	10	29.84	30.25	+.05	40.4	-2.8	65	7	49	17	25	31	31	29	69	1.84	-0.9	7	4,664	n.	25	n.	2	16	6	9	4.5	75	1889	10	1894
Wilmington	78	26	30.14	30.23	+.07	45.8	-3.4	70	7	55	21	25	36	31	36	76	3.21	+0.2	10	5,907	n.	37	w.	15	12	13	6	4.3	78	1879	10	1880
Charleston	52	26	30.20	30.25	+.09	49.5	-2.4	68	9	57	29	25	42	27	38	74	5.76	+2.5	8	5,634	n.	40	ne.	2	14	9	8	4.0	78	1889	13	1880
Columbia	...	10	...	...	...	44.0	-4.5	69	11	55	18	26	33	37	...	...	3.38	+0.3	8	...	ne.	...	...	...	13	7	11	...	77	1889	9	1894
Augusta	180	25	30.04	30.24	+.08	45.4	-4.1	71	8	56	21	26	35	36	35	77	3.23	-0.2	6	3,854	nw.	19	w.	23	17	6	8	3.8	78	1889	7	1880
Savannah	98	26	30.13	30.24	+.06	49.8	-3.1	72	9	59	28	25	41	30	40	77	6.86	+3.6	8	6,117	n.	27	nw.	2	18	5	8	3.7	80	1875	12	1894
Jacksonville	43	26	30.16	30.21	+.05	53.8	-2.9	74	9	62	34	3	46	30	46	82	2.17	-0.7	8	5,169	n.	28	nw.	2	13	4	14	5.5	81	1875	14	1894
Florida Peninsula.						65.5	-1.4										2.24	-0.1														
Jupiter	28	9	30.11	30.14	-.03	66.0	-1.6	83	9	72	44	23	60	25	58	80	3.25	+0.6	10	7,414	nw.	30	n.	25	7	13	11	5.7	86	1891	24	1894
Key West	22	27	30.11	30.13	+.01	70.3	0.0	83	9	74	58	17	66	13	62	78	2.21	+0.6	12	8,950	ne.	46	n.	21	7	17	7	5.7	88	1876	44	1894
Tampa	36	7	30.14	30.18	+.02	60.2	-2.6	80	8	69	40	25	51	29	53	84	1.25	-1.4	9	4,891	n.	28	n.	2	16	6	9	4.5	83	1891	19	1894
East Gulf States.						51.6	-1.3										2.33	-2.0														
Atlanta	1,131	19	29.02	30.26	+.06	44.2	-1.1	69	8	52	20	25	36	29	35	74	1.42	-3.0	4	7,090	nw.	32	nw.	15	17	5	9	4.1	72	1889	1	1880
Pensacola	56	18	30.17	30.23	+.07	52.6	-2.7	75	11	61	31	25	44	25	43	75	2.09	-1.8	6	7,024	n.	35	ne.	1	16	6	9	4.2	76	*	14	1894
Mobile	57	26	30.20	30.24	+.07	51.2	-1.6	76	8	60	31	25	42	29	42	78	3.56	-0.9	9	5,215	n.	34	se.	31	16	6	9	4.3	79	1884	14	1880
Montgomery	221	25	30.01	30.25	+.07	48.7	-1.8	77	8	58	24	26	39	34	38	74	2.13	-2.5	5	4,616	e.	22	nw.	15	19	3	9	3.7	79	1889	8	1880
Vicksburg	254	26	29.94	30.21	+.03	52.2	+1.9	75	11	62	30	25	42	28	38	67	1.38	-3.6	4	5,006	se.	24	nw.	18	17	9	5	3.9	79	*	12	1880
New Orleans	54	27	30.17	30.23	+.09	54.6	-1.9	78	14	62	32	1	47	24	45	78	3.77	-0.6	10	7,157	n.	24	sw.	14	13	6	12	5.3	81	1894	20	1880
Port Eads	...	10	...	...	...	57.7	-1.8	76	8	64	38	9	51	20	...	...	2.29	-1.3	8	...	n.	...	...	...	11	5	15	...	...	...	...	...
West Gulf States.						52.6	+1.5										1.08	-2.2														
Shreveport	249	26	29.95	30.22	+.06	51.4	+2.1	79	23	62	25	2	40	30	38	65	0.75	-3.9	3	4,738	se.	30	se.	31	20	9	2	2.7	79	*	10	1880
Fort Smith	481	15	29.68	30.20	+.04	46.2	+3.0	74	11	58	19	1	35	41	32	63	0.33	-2.8	4	4,572	e.	32	e.	31	18	6	7	3.4	79	1889	2	1892
Little Rock	302	18	29.91	30.25	+.08	46.8	+1.6	73	11	57	22	1	36	34	33	65	0.51	-3.8	3	4,746	sw.	27	nw.	17	14	10	7	4.4	78	1889	6	1880
Corpus Christi	20	10	30.20	30.22	+.08	57.6	+0.5	80	14	66	32	1	50	30	50	83	0.73	-0.6	5	7,104	nw.	30	n.	18	20	5	6	3.1	81	*	24	1887
Galveston	42	26	30.20	30.24	+.10	56.7	-1.3	73	17	62	34	1	51	19	49	78	2.33	-1.7	9	7,827	se.	32	n.	1	19	3	9	3.9	77	1894	18	1880
Palestine	510	15	29.68	30.24	+.07	53.0	+2.6	80	23	64	23	2	42	33	37	63	2.15	-1.7	4	4,653	ne.	27	se.	30	15	8	8	4.4	81	*	8	1894
San Antonio	704	18	29.48	30.24	+.09	56.5	+1.7	83	13	68	30	2	45	35	39	60	0.74	-1.2	5	5,657	n.	30	n.	14	18	4	9	3.9	86	1890	10	1880
Ohio Val. & Tenn.						39.5	+1.1										1.41	-2.1														
Chattanooga	762	18	29.45	30.29	+.10	43.7	-0.1	69	10	54	19	25	34	32	32	70	0.83	-3.7	5	4,895	ne.	31	nw.	15	12	11	8	4.9	73	1889	3	1880
Knoxville	980	26	29.20	30.28	+.08	40.6	-0.1	65	8	50	17	25	31	33	30	71	0.95	-3.2	3	3,475	ne.	31	sw.	22	18	4	9	3.9	75	1874	-5	1880
Memphis	399	26	29.81	30.25	+.07	46.8	+3.3	73	11	55	21	1	38	28	38	75	0.56	-3.6	4	6,954	s.	30	w.	18	18	6	7	3.6	76	*	3	1880
Nashville	545	27	29.65	30.25	+.09	42.9	+0.7	69	12	52	19	25	34	30	31	69	1.79	-1.9	4	4,815	nw.	30	s.	17	17	5	9	4.1	75	1874	-2	1876
Lexington	989	14	29.14	30.23	+.06	38.4	+1.2	63	12	46	13	1	31	28	28	60	2.56	-0.6	5	9,347	sw.	38	s.	22	6	8	17	6.8	68	1889	-6	1894
Louisville	525	26	29.65	30.24	+.07	41.0	+2.5	66	12	49	15	1	33	26	29	66	2.15	-1.7	5	6,474	s.	27	sw.	22	9	9	13	5.9	74	1875	-7	1880
Indianapolis	823	26	29.31	30.23	+.09	36.1	+2.6	61	12	42	12	1	30	24	27	71	1.13	-2.0	6	7,518	s.	36	sw.	5	5	14	12	6.4	68	*	-15	1876
Cincinnati	628	27	29.55	30.25	+.09	38.1	+0.9	61	12	45	14	1	31	25	28	68	1.09	-2.1	6	5,432	s.	29	s.	4	11	7	13	5.8	72	1875	-8	1872
Columbus	824	19	29.31	30.23	+.09	34.8	+0.6	58	13	41	8	24	28	26	28	80	1.52	-1.4	9	5,708	sw.	28	sw.	4	5	12	14	7.0	67	1889	-12	1880
Pittsburg	842	27	29.49	30.22	+.09	35.2	-0.6	60	12	42	11	24	28	25	28	77	1.37	-1.5	11	4,785	w.	20	sw.	13	2	15	14	7.0	73	1885	-9	1880
Parkersburg	638	9	29.54	30.26	+.07	36.8	+0.6	64	13	45	10	25	29	30	30	82	1.56	-1.7	10	4,487	s.	30	w.	18	6	9	16	6.8	71	1892	-4	1894
Lower Lake Region.						30.4	-0.8										1.31	-1.0														
Buffalo	768	27	29.32	30.19	+.13	30.2	-0.3	57	12	36	8	24	25	21	23	77	0.84	-2.5	11	12,549	w.	56	w.	9	0	9	22	8.5	63	*	-9	1880
Oswego	335	27	29.79	30.18	+.12	26.6	-2.8	53	13	33	-1	24	20	23	20	79	3.16	-0.2	19	9,291	se.	40	w.	18	3	7	21	7.6	65	1875	-18	1884
Rochester	523	27	29.58	30.17	+.11	28.8	-0.7	55	12	34	8	24	23	25	21	72	2.21	-0.7	15	6,238	sw.	30	w.	18	4	5	22	8.1	70	1875	-11	1871
Erie	714	24	29.39	30.19	+.12	31.6	-1.9	58	12	36	13	23	27	23	26	80	1.76	-1.5	11	8,949	sw.	35	nw.	18	2	9	20	7.3	70	1889	-11	1880
Cleveland	762	27	29.34	30.20	+.11	32.6	+1.1	57	12	38	14	1	28	23	26	79	2.30	-0.3	13	10,906	s.	48	nw.	18	4	6	21	7.8	68	1875	-12	1880
Sandusky	629	20	29.49	30.20	+.10	32.4	+0.1	50	12	38	5	24	27	22	26	77	2.09	-0.4	9	6,629	w.	33	nw.	18	3	7	21	7.8	70	1889	-13	1880
Toledo	674	26	29.45	30.21	+.12	31.0	-0.5	58	12	37	1	24	25	18	27	86	1.17	-1.2	6	6,991	sw.	33	sw.	9	6	8	17	6.9	70	1889	-15	1872
Detroit	730	27	29.37	30.20	+.12	30.2	-1.3	56	12	35	2	24	25	19	25	82	0.93	-1.6	9	6,903	sw.	34	sw.	9	6	8	17	7.3	65	*	-24	1872
Upper Lake Region.						27.1	+2.1										0.95	-1.3														
Alpena	609	25	29.45	30.14	+.11	26.6	+1.6	47	11	32	4	23	21	25	22	83	1.01	-1.5	8	6,531	sw.	36	nw.	18	3	11	17	7.4	56	1875	-15	1880
Grand Haven	628	26	29.45	30.16	+.11	31.2	+1.2	51	12	36	9	1	26	20	28	90	1.30	-1.4	15	7,300	sw.	36	sw.	25	4	4	23	8.1	61	1877	-12	1884
Marquette	734	26	29.26	30.09	+.06	25.6	+2.3	52	11	31	-6	1	20	19	20	82	1.37	-1.1	12	7,371	w.	42	sw.	11	5	9	17	7.0	59	1875	-20	1880
Port Huron	639	23	29.47	30.20	+.13	28.8	+0.5	53	12	34	6	2	24	19	22	78	1.31	-1.0	13	7,865	s.	36	w.	9	6	10	15	6.4	65	1875	-14	1880
Sault Ste. Marie	624	9	29.41	30.12	+.12	21.1	-0.8	43	11	28	-5	23	14	25	18	87	0.95	-1.2	11	5,936	se.	44	nw.	30	6	9	16	7.0	48	1891	-19	1894
Chicago	824	26	29.27	30.19	+.11	32.9	+3.4	57	12	38	8	1	28	22	27	81	0.16	-2.2	5	11,904	w.	47	s.	25	4	10	17	7.2	68	1875	-23	1872
Milwaukee	373	27	29.42	30.18	+.10	30.4	+4.1	55	12	36	4	1	25	21	25	81	0.76	-1.2	11	6,609	sw.	30	w.	10	4	8	19	7.5	63	1877	-22	1884
Greenbay	617	11	29.47	30.18	+.12	25.8	+2.8	47	11	32	-4	1	20	26	21	82	0.88	-1.6	10	5,083	s.	24	nw.	18	5	14	12	6.3	51	1894	-21	1886
Duluth	702	27	29.30	30.11	+.03	21.8	+3.8	46	10	28	-21	1	16	21	18	86	0.84	-0.5	13	6,425	sw.	40	n.	18	12	7	12	5.6	54	1891	-34	1879
North Dakota.						17.7	+5.0										0.30	-0.4														
Moorhead	935	16	29.02	30.11	-.04	14.6	+3.6	41	*	23	-27	1	6	30	11	85	0.73	0.0	6	7,677	s.	41	w.	27	6	12	13	6.3	55	1883	-36	1887
Bismarck	1,674	23	28.23	30.12	-.02	19.0	+4.8	46	11	28	-23	2	10	33	10	68	0.03	-0.6	3	4,816	nw.	29	s.	31	11	8	12	5.5	64	1890	-38	1879
Williston	1,875	18	27.97	30.08	-.00	19.6	+6.6	48	9	30	-26	2	9	35	17	89	0.14	-0.6	5	4,718	sw.	34	w.	9	8	17	6	4.7	50	1885	-46	1879
Upper Miss. Valley.						22.7	+4.5										0.74	-1.3														
Minneapolis	...	7	...	...	...	24.3	+4.2	48	11	31	-9	1	18	24	...	...	0.57	-1.2	6	...	s.	...	...	...	3	9	19	...	54	1890	-16	1892
St. Paul	837	26	29.19	30.14	+.08	23.3	+4.1	45	28	30	-9	1	17	26	21	87	0.71	-0.6	8	4,686	se.	23	nw.	17	5	8	18	7.3	58	1888	-30	1879
La Crosse	...	25	...	...	...	26.6	+2.6	51	11	34	-4	1	19	26	...	...	0.60	-0.8	11	4,542	s.	26	nw.	18	4	6	21	7.8	70	1891	-37	1872
Davenport	500	25	29.49	30.17	+.04	32.8	+4.5	59	11	39	8	21	26	28	27	82	0.65	-1.1	7	5,113	nw.	25	sw.	25	5	10	16	7.0	65	1889	-22	1886
Des Moines	867	19	29.22	30.19	+.04	34.0	+8.0	59	11	42	12	1	27	27	26	76	0.85	-0.6	5	5,361	nw.	30	sw.	25	11	9	11	5.5	69	1889	-20	1886
Dubuque	650	24	29.44	30.18	+.07	30.4	+4.7	58	11	37	6	1	24	29	25	82	0.71	-1.1	9	2,741	s.	22	nw.	4	7	3	21	7.4	67	1889	-24	1886
Keokuk	614	26	29.50	30.19	+.06	36.0	+6.2	65	11	42	10	1	30	32	29	80	0.81	-1.2	5	5,350	sw.	25	s.	3	10	9	12	5.6	69	1889	-22	1872
Cairo	359	26	29.83	30.23	+.08	42.9	+3.4	70	12	50	18	1	35	30	31	69	1.18	-2.2	8	6,040	s.	26	s.	12	9	10	12	5.6	74	1889	-7	1872

TABLE I.—*Climatological data for Weather Bureau Stations, December, 1896*—Continued.

Stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Humidity and precipitation.					Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Monthly temperature data since opening station.			
			Mean pressure, 8 a.m. and 8 p.m. ÷ 2.	Mean reduced.	Departure from normal.	Mean max. and min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.					Absolute maximum.	Year	Absolute minimum.	Year.
Up. Miss. Val.—Con																																
Springfield, Ill	644	18	29.48	30.20	+ .05	36.2	+ 2.9	64	11	43	9	1	29	30	28	76	0.31	- 2.4	6	6,867	s.	26	se.	31	4	12	15	6.6	67	1889	-14	1880
Hannibal	534	....	29.60	30.20	......	37.4	......	69	11	45	12	1	30	40	29	76	0.65	- 1.2	5	6,519	sw.	28	sw.	3	8	11	12	6.0	....	....	......	....
St. Louis	567	26	29.60	30.23	+ .08	40.8	+ 4.5	68	11	48	17	1	34	27	30	71	1.06	- 1.8	4	7,575	s.	30	sw.	5	12	4	15	5.8	74	1875	-17	1872
Missouri Valley.						34.8	+ 6.1										0.54	- 0.3														
Columbia	......	8	......	......	......	39.3	+ 4.2	72	11	49	12	1	30	43	......	......	1.11	- 0.9	4	6,281	sw.	24	nw.	18	10	7	14	6.4	75	1889	- 7	1892
Kansas City	963	9	29.15	30.21	+ .03	40.4	+ 7.1	67	11	49	17	1	32	27	31	74	0.71	- 0.8	4	5,763	sw.	28	sw.	25	14	8	9	4.9	70	*	-13	1892
Springfield, Mo	1,324	11	28.76	30.20	+ .06	41.6	+ 4.6	68	11	50	16	1	34	28	30	70	0.79	- 2.1	4	7,548	se.	36	se.	16	9	14	8	5.1	74	1880	-10	1892
Topeka	......	10	......	......	......	41.0	+ 6.8	69	11	52	17	1	30	38	......	......	0.31	- 0.8	3	......	s.	....	......	....	9	13	9	....	74	1889	-10	1892
Omaha	1,108	26	28.95	30.17	- .03	35.2	+ 8.2	56	28	42	10	2	28	22	29	79	0.50	- 0.5	3	4,988	nw.	26	sw.	25	10	11	10	5.5	71	1890	-17	1884
Sioux City	1,165	8	......	......	......	30.0	+ 5.9	55	10	39	- 8	1	21	35	......	......	0.25	- 0.9	3	6,714	s.	35	se.	27	9	9	13	5.8	68	1890	-16	1892
Pierre	1,460	22	28.48	30.11	- .06	29.4	+ 8.9	56	29	38	- 7	1	20	38	22	80	0.28	- 0.2	1	5,077	se.	30	e.	13	8	13	10	5.5	67	*	-30	1884
Huron	1,310	16	28.67	30.16	- .03	21.2	+ 3.0	44	9	29	-11	2	13	31	14	75	0.36	- 0.2	7	8,452	se.	46	se.	24	4	17	10	6.0	65	1894	-34	1884
Northern Slope.						33.6	+ 9.2										0.11	- 0.4														
Havre	2,477	17	27.29	29.99	- .16	30.0	+12.3	59	10*	39	-22	2	21	42	24	79	0.11	- 0.5	3	7,284	sw.	44	sw.	9	10	14	7	5.0	68	1885	-50	1884
Miles City	2,372	20	27.46	30.04	- .12	31.4	+12.1	55	9	40	-11	2	22	30	25	78	0.09	- 0.2	3	3,792	sw.	24	se.	30	10	12	9	5.4	57	1881	-46	1879
Helena	4,108	17	25.83	30.13	- .04	35.9	+12.2	55	9	42	6	1	30	23	24	63	0.35	- 0.6	5	4,382	sw.	50	sw.	4	10	6	15	6.5	57	1885	-40	1880
Rapid City	3,260	11	26.61	30.08	- .10	37.8	+ 7.9	70	9	50	- 3	1	26	35	21	59	0.01	- 0.2	1	5,850	sw.	36	se.	31	13	11	7	4.9	75	1890	-25	1882
Cheyenne	6,105	26	24.04	30.19	+ .02	36.4	+ 6.9	61	22	48	8	7	24	39	6	36	0.03	- 0.2	1	8,924	nw.	56	nw.	4	11	13	7	5.3	64	*	-24	*
Lander	5,372	13	24.70	30.28	+ .10	27.4	+ 4.7	52	4	40	0	1	14	36	16	69	T.	- 0.5	0	2,313	sw.	26	nw.	4	13	17	1	3.7	57	1890	-29	1892
North Platte	2,826	23	27.16	30.21	+ .02	36.2	+ 8.5	64	22	49	7	1	23	40	23	71	0.21	- 0.4	2	5,457	w.	36	nw.	16	12	17	2	3.9	70	1890	-27	1879
Middle Slope.						41.1	+ 6.2										0.57	- 0.4														
Denver	5,290	26	24.79	30.22	+ .04	38.8	+ 4.8	68	4	52	18	7	26	35	13	41	0.31	- 0.4	2	5,639	s.	36	w.	4	7	17	7	5.0	74	1885	-25	1876
Pueblo	4,713	9	25.34	30.20	+ .07	38.4	+ 3.7	74	22	54	10	1	22	50	13	44	0.63	+ 0.1	4	4,154	nw.	35	n.	31	14	13	4	4.7	74	1896	-18	1892
Concordia	1,398	12	28.64	30.18	+ .03	40.5	+ 8.0	66	22	50	18	18	31	31	29	73	0.09	- 0.4	1	4,360	s.	27	se.	16	15	7	9	4.8	72	1889	-10	1887
Dodge City	2,504	23	27.50	30.19	+ .03	41.1	+ 8.0	70	22	54	15	18	28	43	27	67	0.53	- 0.1	2	6,905	s.	40	s.	27	20	5	6	3.8	79	1894	-15	1876
Wichita	1,351	9	28.71	30.19	+ .06	42.4	+ 7.8	72	22	54	16	18	31	37	28	67	0.63	- 0.3	3	5,676	s.	31	n.	17	16	6	9	4.3	74	1894	-10	1894
Oklahoma	1,218	7	28.88	30.21	+ .07	45.2	+ 4.7	75	22	57	17	1	34	39	32	70	1.22	- 1.2	4	5,355	sw.	26	s.	16	24	2	5	3.1	75	1896	- 1	1894
Southern Slope.						46.4	+ 4.8										2.63	+ 1.6														
Abilene	1,749	12	28.36	30.24	+ .06	49.4	+ 2.7	76	*	61	17	1	38	37	33	64	2.48	+ 1.0	5	6,104	sw.	32	sw.	16	17	9	5	3.5	81	1893	6	1894
Amarillo	3,691	5	26.35	30.20	+ .04	43.3	+ 6.8	72	22	56	17	1	31	38	26	58	2.88	+ 2.1	3	10,486	s.	42	se.	29	18	9	4	3.2	75	1894	0	1894
Southern Plateau.						48.9	+ 1.9										0.54	- 0.2														
El Paso	3,767	19	26.31	30.22	+ .07	47.1	+ 2.0	71	5	62	21	1	32	42	21	43	0.06	- 0.5	1	7,148	nw.	58	nw.	16	20	9	2	2.6	76	1889	- 5	1880
Santa Fe	6,908	24	23.34	30.23	+ .08	35.8	+ 3.1	57	23	46	18	1	26	31	16	52	0.67	- 0.2	2	4,301	ne.	24	se.	29	18	9	4	3.6	65	1878	-13	1879
Phœnix	1,076	....	28.93	30.08	......	54.2	+ 1.2	75	22	69	33	8	40	39	33	50	0.67	- 0.4	2	2,294	e.	26	nw.	16	19	11	1	2.7	....	....	......	....
Yuma	139	21	29.94	30.09	+ .03	58.6	+ 1.3	78	3	71	41	30	46	34	34	46	0.78	+ 0.3	2	4,610	n.	34	nw.	28	24	6	1	1.9	83	1893	25	1891
Middle Plateau.						37.1	+ 3.4										0.62	- 1.1														
Carson City	4,720	10	25.34	30.20	......	38.2	+ 3.3	63	4	51	15	21	25	43	23	57	0.80	- 1.4	5	......	sw.	....	......	....	17	9	5	3.9	65	1895	- 7	1889
Winnemucca	4,340	18	25.76	30.22	+ .01	37.0	+ 5.2	56	14	48	16	22	26	33	23	61	0.23	- 1.1	3	6,437	sw.	49	sw.	14	8	13	10	5.9	65	1878	-20	1879
Salt Lake City	4,344	23	25.79	30.31	+ .07	36.2	+ 1.7	54	26	45	17	1	28	30	27	73	0.84	- 0.8	6	3,239	se.	26	sw.	13	2	13	16	7.3	61	1874	-10	1879
Northern Plateau.						34.3	+ 4.2										2.00	0.0														
Baker City	3,470	8	26.51	30.13	.00	34.8	+ 6.3	48	28	40	14	1	29	19	28	79	1.18	- 0.6	11	4,732	se.	28	s.	14	2	6	23	8.1	53	1892	- 6	1891
Idaho Falls	4,742	7	25.36	30.32	+ .09	27.3	+ 4.6	43	24	36	9	11	19	26	22	85	0.82	- 0.9	10	4,627	n.	32	s.	13	13	4	14	5.5	56	1892	-22	1892
Spokane	1,943	15	27.99	30.10	- .02	35.8	+ 5.0	52	8	40	19	1	31	18	33	88	3.47	+ 0.9	18	3,524	n.	28	sw.	7	2	10	19	7.9	57	*	-18	1884
Walla Walla	1,018	11	28.99	30.12	+ .03	39.2	+ 1.8	64	10	44	10	1	34	29	34	85	2.55	+ 0.4	20	3,646	s.	37	s.	10	0	8	23	7.9	65	1890	9	1889
N. Pac. Coast Reg.						44.8	+ 2.2										12.27	+ 3.1														
Fort Canby	179	14	29.75	29.95	- .01	45.6	+ 1.4	54	26	49	33	16	42	11	44	92	16.04	+ 6.1	24	15,702	se.	78	se.	29	1	5	25	8.4	58	1886	21	1884
Port Angeles	29	13	......	......	......	42.6	+ 4.4	57	*	48	32	*	38	21	......	......	6.65	+ 1.5	26	3,245	se.	30	sw.	9	0	8	23	8.5	64	1895	5	1884
Pysht‡	......	....	......	......	......	43.4	......	54	*	48	30	16	39	16	......	......	14.99	......	24	......	e.	....	......	....	3	1	26	....	....	....	......	....
Seattle	119	....	29.84	29.97	......	44.5	......	58	3	48	29	16	40	16	42	88	7.58	......	23	5,004	se.	28	s.	13	0	8	23	8.4	....	....	......	....
Tatoosh Island	86	14	29.81	29.91	- .02	45.4	+ 1.7	52	20	48	35	17	43	11	41	82	19.91	+ 5.4	27	14,018	e.	54	s.	9	1	0	30	9.4	60	1895	19	1884
Astoria	......	12	......	......	......	46.0	+ 1.5	59	3	50	33	16	42	17	......	......	19.14	+ 8.1	23	......	e.	....	......	....	1	7	23	....	62	1891	10	1884
Portland, Oreg	153	26	29.85	30.01	- .07	43.9	+ 1.9	62	3	48	27	1	40	27	40	87	6.26	- 1.5	19	6,427	se.	42	s.	7	1	8	22	7.9	65	1886	8	1879
Roseburg	521	20	29.47	30.04	- .08	45.6	+ 2.3	65	3	51	31	29	40	25	42	87	5.60	- 0.8	19	2,225	se.	24	s.	29	5	9	17	6.8	66	*	7	1879
Mid. Pac. C'st Reg.						50.9	+ 1.6										5.42	- 0.3														
Eureka	64	10	30.04	30.10	+ .02	51.0	+ 2.5	66	10	58	36	21	44	24	46	85	9.41	+ 1.2	16	4,141	se.	36	se.	30	5	14	12	6.5	70	1891	30	*
Redbluff	334	20	29.79	30.15	+ .02	49.0	+ 1.5	63	9	56	35	21	42	24	43	83	6.20	+ 1.0	13	4,250	nw.	35	se.	30	9	8	14	6.2	76	1893	25	*
Sacramento	71	20	......	......	......	49.4	+ 0.9	63	27	56	33	7	42	25	......	......	1.76	- 2.4	10	5,629	se.	35	se.	28	4	11	16	7.0	69	1893	24	*
San Francisco	153	26	29.98	30.14	+ .02	52.8	+ 0.5	64	8	58	42	19	48	17	47	84	4.34	- 0.7	11	5,717	n.	36	se.	26	6	13	12	6.2	72	1893	34	*
Point Reyes Light	......	8	......	......	......	52.4	+ 2.6	67	21	57	45	7	48	18	......	......	5.40	- 0.5	12	......	se.	....	......	....	7	12	12	....	....	....	......	....
S. Pac. Coast Reg.						55.8	+ 2.8										1.77	- 0.5														
Fresno	332	10	29.79	30.15	+ .01	49.3	+ 2.6	69	14	58	30	1	40	31	42	78	1.00	- 0.5	10	2,817	se.	22	se.	28	13	7	11	5.3	71	1895	26	1895
Los Angeles	330	20	29.75	30.10	+ .02	59.0	+ 3.1	84	3	70	42	5	48	34	44	66	2.12	- 1.9	5	2,700	ne.	16	e.	15	15	12	4	3.5	88	*	30	*
San Diego	69	26	30.05	30.13	+ .05	59.0	+ 2.7	78	*	68	46	18	50	26	47	72	2.18	0.0	5	2,623	ne.	25	sw.	28	20	8	3	3.4	82	1874	32	*
San Luis Obispo	201	....	29.92	30.14	......	54.5	......	79	10	67	33	1	42	41	42	70	3.04	......	9	3,285	n.	24	se.	15	20	5	6	3.6	....	....	......	....

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. * Two or more directions, dates, or years. † Received too late to be considered in departures, &c. ‡ Record for 30 days. § All values except precipitation for 26½ days only. Milwaukee, Wis., altitude was changed to 670 feet on November 27, 1896.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, December, 1896.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Alabama.					
Alco†	74	22	49.1	2.33	
Ashville*†[1]	76	17	43.6	1.11	
Bermuda†	76	22	49.4	2.88	
Birmingham†	73	20	48.0	1.07	
Brewton†	68	20	45.6	2.25	
Bridgeport†				1.29	
Citronelle†	74	29	51.4	2.47	
Clanton†	73	22	47.0	2.32	T.
Cordova†				1.39	
Daphne†	77	24	49.7	2.62	
Decatur†	69	15	42.0	1.09	
Demopolis†				0.70	T.
Elba†	74	19	47.7	1.85	
Eufaula a†	74	26	48.2	3.38	
Evergreen†	73	22	45.7	3.01	
Florence a†				1.42	
Florence b†	68	20	44.2	1.45	
Fort Deposit†	77	20	46.8	0.80	
Gadsden	72	20	44.6	0.57	
Goodwater†	76	20	45.3	0.50	T.
Greensboro†	75	24	48.3	0.98	0.1
Hamilton				0.81	
Healing Springs†	88	16	47.8	4.77	
Highland Home†	73	27	50.0	2.00	
Livingston	75	20	50.2	0.35	
Lock No. 4				0.87	
Madison Station†	69	16	43.2	1.29	
Marion†	74	27	47.8	2.00	
Montgomery					T.
Mount Willing†	77	22	49.3	1.95	
Newbern†	74	23	47.8	1.40	
Newburg	68	13	44.5	0.60	
Newton†	78	20	48.0	2.96	
Opelika†	79	22	48.6	1.30	
Oxanna†	70	18	43.2	0.66	1.0
Pineapple†				2.15	
Pushmataha†	77	22	47.8	1.50	
Rockmills†	76	19	48.9	2.20	2.0
Scottsboro†	71	17	42.6	1.80	
Selma†				2.14	
Talladega*[1]	70	20	44.6	0.59	
Tallassee†				1.30	
Tuscaloosa†	75	20	46.0	1.11	
Union†	75	21	48.6	0.37	
Union Springs†	74	22	46.4	2.95	
Uniontown†	78	25	49.7	1.87	
Valleyhead†	68	15	43.1	0.77	
Warrior†				1.40	
Wetumpka				1.78	
Wilsonville†				1.36	T.
Alaska.					
Killisnoo	41	24	33.6	8.25	21.0
Arizona.					
Benson*[8]	71	31	46.8	0.00	
Bisbee†	71	31	49.4	0.36	
Buckeye†	84	28	57.1	0.30	
Buttes				1.09	
Casa Grande*[8]	70	30	56.9	0.70	
Congress	73	36	55.5	1.04	
Dragoon†				0.00	
Dragoon Summit*[5]	62	32	51.4	0.05	0.5
Dudleyville	73	26	48.7	0.47	
Eagle Pass*[3]			33.2	0.57	T.
Farleys Camp†	78	33	56.8	1.00	
Fort Apache	64	10	38.5	0.68	1.1
Fort Grant†	74	21	49.2	0.24	0.1
Fort Huachuca†	76	27	52.0	0.40	
Fort Mohave	80	36[j]	55.8[e]	1.41	
Gilabend a*[8]	76	40	57.3	1.40	
Glendale	75	31	53.2	0.63	
Holbrook†	63	13	34.6	0.38	
Ingleside	77	32	53.8	0.70	
Lochiel				0.20	
Maricopa*[8]	89	30	58.8	0.00	
Mesa†	75	32	52.6	0.75	
Mount Huachuca	69	26	46.4	0.42	
Natural Bridge				0.62	
Oracle†	66	33	50.0	1.41	2.0
Oro				0.42	
Oro Blanco	78	29	52.4	0.37	
Pantano*[8]	60	29	46.5	0.08	
Parker*	79	28	53.1	0.52	
Payson				1.15	1.5
Peoria†	74	36	53.0	0.73	
Phœnix	74	29	51.4	0.60	
Pinal Ranch				1.13	2.0
Reymert†	82	35	59.2	0.91	
San Carlos†	72	24	45.8	0.35	
San Simon*[8]	73	32	49.6	0.17	
Showlow				0.45	0.8
Signal†	72	30	51.4	1.71	
Sulphur Spring Valley†				0.32	
Texas Hill*[8]	80	32	58.6	0.45	
Tucson c†	90	27	54.0	0.76	
Walnut Ranch*†[1]	69	25	44.7	0.37	2.5
Whipple Barracks†	69	14	40.4	0.97	2.9
Arizona—Cont'd.					
Willcox*[8]	68	26	43.6	0.00	
Arkansas.					
Amity	78	18	46.6	0.82	
Arkansas City†				0.25	
Beebranch†[8]	76	17	44.2	0.40	
Blanchard Springs†	73	20	46.9	0.52	
Brinkley	76	20	46.8	0.83	
Camden a†				0.58	
Camden b†	72	17	44.8	1.48	
Canton*[1]	69	13	41.0		
Conway*[6]	68	21	44.7	1.26	
Corning†	70	14	41.5	1.27	
Dallas	72	17	46.2	1.15	
Dardanelle				0.73	
Elon†	78	20	49.2	0.47	
Fayetteville†	75	13	44.7	0.60	
Forrest	76	20	46.8	0.85	
Helena a†				0.28	
Hot Springs a	63	22	42.7		
Hot Springs b				1.07	
Hot Springs (near)				1.50	
Keesees Ferry†	75	8	43.4	0.45	
Lacrosse†	71	13	42.2	0.15	
Lonoke*[1]	73	22	46.2	0.62	
Luna Landing*[6]	75	25	49.9	0.15	
Lutherville*[1]	73	17	46.0		
Malvern†	75[e]	18	45.7	0.98	
Marianna*[1]	72	24	47.9		
Marvell	73	22	47.1	0.20	
Moore				0.39	
Mossville	68	19	44.6	1.29	
Mount Nebo†	67	17	45.3	1.78	
New Gascony*[1]	68	22	45.4	0.62	
Newport a†				0.82	
Newport c†	76	15	45.4	0.79	
Oregon*[1]	70	14	41.8		
Osceola†	76	18	45.2	0.81	
Ozark†	70	21	46.4	0.90	
Picayune†		22		1.75	
Pinebluff†	78	21	50.1	0.57	
Pocahontas†	70	15[e]	41.5	1.33	
Postelle				0.18	
Prescott†	78			1.26	
Rison[1]	74	20	50.2	2.00	
Silver Springs†	70	9	41.0	0.38	T.
Stuttgart†	71	19	45.4	0.55	
Texarkana†	81	20	50.6	0.09	
Warren†	75	18	49.0	2.75	
Washington*†[1]	75	25	48.5	0.77	
Wiggs*[1]	74	18	49.4	0.96	
Witts Springs†	72	12	44.3	1.45	
California.					
Adin	55	24	39.0	2.90	11.5
Agnew	64	34	53.1	2.50	
Arlington Heights	80	36[e]	56.0	0.90	
Athlone*[5]	69	30	47.9	0.92	
Azusa				1.61	
Ballast Point L. H.				2.43	
Barstow†	74	24	49.5	0.30	
Bear Valley†				8.02	22.0
Berkeley	61	39	50.8	4.92	
Bishop†	71	20	42.1	0.48	
Bishop Creek*[6]	68	24	41.2	0.16	
Boca*[8]	66	11	33.5	1.80	11.0
Bodie†	48	1	26.4	0.86	10.0
Bowmans Dam†				10.31	22.0
Caliente*[8]	69	35	53.3	1.93	
Calloway Canal†				0.80	
Cape Mendocino L. H.				10.28	
Castle Pinckney*[1]	78	45	49.3	3.05	
Cedarville†	52	22	36.4	1.87	2.0
Centerville*[1]	68	39	56.3	2.91	
Chico*[8]	67	35	52.0	5.81	
Chino*‡[6]	78	34	54.3	1.77	
Cisco*[8]	46	20	35.0		34.0
Claremont†	77	36	53.4	1.44	
Corning*[8]	64	30	47.0	7.40	
Coronado	89	49	64.6	2.18	
Craftonville	73	34	52.0	1.49	
Crescent City†	62	32	49.8	15.14	
Crescent City L. H.				10.31	
Daunt				1.90	
Davisville b	80	34	55.0	2.21	
Delano*[8]	67	33	47.7	0.70	
Delta*[5]	55	33	44.1	17.23	
Descanso*[5]	70	28	51.2	2.43	
Drytown	67	31	47.8	3.34	
Dunnigan*[3]	68	32	51.8	4.32	
Durham*[1]	56	29	44.2	5.23	
East Brother L. H.				3.85	
Edgwood*[8]	54	24	40.8	5.16	
Edmanton*†[1]	57	22	37.0	11.13	25.0
Escondido	88	28	51.7		
Fallbrook*[1]	82	39	55.0	2.13	
Famosa†	70	33	47.4	0.88	
Folsom City b*[1]	66	34	50.0	1.77	
California—Cont'd.					
Fordyce Dam†				6.43	40.0
Fort Bragg†				9.53	
Fort Ross				13.95	
Fort Tejon				4.47	
Georgetown†	67	32	48.5	6.37	
Glendora				1.25	
Goshen*[8]	67	29	44.0	0.35	
Grand Island*[5]	62	37	50.3	2.99	
Grass Valley				5.78	
Greenville†	61	17	37.4	6.20	9.0
Guinda				4.57	
Healdsburg*[1]	62	34	46.5	9.54	
Hollister	74	29	51.0	1.31	
Hueneme				2.29	
Humboldt L. H.				10.30	
Indio*[8]	73	38	45.0	0.00	
Iowa Hill*[1]	69	31	47.4	5.13	0.5
Isabella*[5]	72	25	46.8	0.70	
Jackson	58	30	44.4	4.61	
Jolon				2.11	
Keeler*[8]	70	35	48.6	0.25	
Keene*[8]	68	31	49.9	1.90	
Kennedy Gold Mine	64	31	48.7	4.55	
Kernville				0.85	
King City*[8]	74	32	57.2	1.46	
Kingsburg*[8]	70	30	49.1	0.60	
Kono Tayee	59	36	47.2	5.93	
Lagrange*[5]	67	34	52.2	1.94	
Laporte*†[1]	60	25	37.5	12.88	31.0
Lemoore a*[8]	68	30	40.9	0.70	
Lick Observatory†	63	28	45.4	4.91	3.0
Lime Kiln	75	31	50.8		
Lime Point L. H.				4.75	
Lodi	64	32	49.8	1.87	
Los Alamos†				2.83	
Los Gatos b	60	38	50.0	6.40	
McMullin*[1]	60	32	49.9		
Malakoff Mine*[1]	66	31	45.6	7.02	0.5
Mammoth Tank*[8]	76	35	57.3	0.00	
Manzana	64	25	42.3	1.46	
Mare Island L. H.				3.73	
Merced*[8]	69	33	51.7	1.04	
Middletown*†[1]	68	24	45.7	11.21	
Mills College				3.59	
Milton (near)*[1]	68	38	54.2	3.72	
Modesto*[8]	78	31	56.4	1.31	
Mohave*[8]	68	32	47.3	0.82	
Mokelumne Hill*[2]		34	46.1	3.84	
Monterey*[8]	68	34	54.0	2.51	
Morena Dam*[1]	70	28	47.9	2.42	
Mount Breckenridge				4.30	16.5
Mount Glenwood*[1]	61	37	49.7	3.95	
Mutah Flat†				2.80	
Napa b	65	30	49.8	3.41	
Needles	76	40	58.6	1.33	
Nevada City†	64	29	45.1	6.46	1.0
Newcastle a†	63	34	47.8	2.46	
Newhall*[5]	79	30	50.6	2.23	
Nordhoff†	86	29	53.9	3.00	
North San Juan*[1]	75	30	48.9	4.20	0.5
Oakland a	62	37	49.3	4.29	
Ogilby*[8]	80	40	59.7	1.00	
Oleta*[1]	65	30	45.9	4.51	
Orangevale†	63	28	48.4	1.70	
Orland*[5]	63	33	47.8	6.14	
Oroville b	78	38	54.0	4.64	
Palermo†	63	32	48.8	3.98	
Paso Robles b	69	30	46.8	2.48	
Peachland*[1]	65	33	49.0	8.83	
Picacho†	76	41	59.9	0.05	
Piedras Blancas L. H				4.08	
Pigeon Point L. H.				2.15	
Pilot Creek				6.99	16.0
Point Ano Nuevo L. H.				3.30	
Point Arena L. H				10.16	
Point Bonita L. H.				6.55	
Point Conception L. H				1.87	
Point Fermin L. H				1.61	
Point Hueneme L. H.				2.62	
Point Lobos	61	43	52.0	4.16	
Point Loma L. H.				1.68	
Point Montara L. H.				4.04	
Point Pinos L. H.				3.52	
Point Reyes L. H.				5.40	
Point Sur L. H				2.61	
Pomona (near)	83	35	55.2	1.57	
Poway*[3]	81	34	48.0	2.42	
Quincy†	56	22	38.4	6.36	5.0
Ravenna*[8]	73	35	52.5	1.17	
Redding b†	69	32	48.4	8.98	
Reedley (near)*[1]	68	35	50.4	1.04	
Represa	66	32	50.0	1.80	
Riovista	62	29	48.8	1.96	
Roe Island L. H.				2.45	
Roseville (near)*[5]	58	28	45.0	1.77	
Rosewood	65	27	45.7	7.44	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Sacramento a	64	33	49.5	2.02	
Salinas *[5]	65	36	47.7	1.75	
Salton *[5]	72	45	56.4	0.62	
San Bernardino†	81	31	54.5	1.09	
San Jacinto	74	32	51.0	1.70	
San Jose b	64	28	48.4	2.55	
San Leandro *[1]	75	42	55.5	2.89	
San Luis L. H.	......	......	......	3.18	
San Mateo *[5]	65	42	53.2	2.98	
San Miguel *[5]	67	27	45.8	1.89	
San Miguel Island	76	42	55.6	1.36	
Santa Ana *[5]	78	40	60.1	2.27	
Santa Barbara a	79	44	58.1	2.92	
Santa Barbara L. H.	......	......	......	2.52	
Santa Clara a *[6]	66	36	50.7	2.69	
Santa Cruz b†	76	30	53.4	4.87	
Santa Cruz L. H.	......	......	......	4.77	
Santa Maria	80	38	57.9	2.34	
Santa Monica *[5]	80	45	63.6	2.01	
Santa Paula b†	78	38	55.4	3.13	
Santa Rosa *[5]	64	36	50.2	6.42	
Saticoy	......	......	......	2.25	
Shasta	......	......	......	13.10	
Sierra Madre	78	41	57.3	1.91	
Sneddens Ranch†	......	......	......	2.40	6.0
Stanford University	64	34	50.2	1.57	
Stockton a	65	31	48.2	1.12	
Summerdale†	58	25	40.8	4.56	18.0
Susanville†	56	22	38.8	2.96	7.5
Sutter Creek *[5]	58	25	42.3	2.84	
Tecarte Dam	......	......	......	2.11	
Tehama *[5]	60	38	50.7	4.33	
Templeton *[5]	68	32	47.8	2.82	
Trinidad L. H.	......	......	......	8.59	
Truckee *[5]	58	14	34.0	2.50	18.0
Tulare b	......	......	......	0.43	
Turlock b†	67	28	48.0	1.41	
Ukiah†	62	29	47.5	10.60	
Upper Mattole *[1]	69	37	51.0	18.49	
Vacaville a *[1]	63	35	49.6	3.54	
Ventura†	84	36	55.3	2.58	
Volcano Springs *[5]	81	39	60.2		
Wainutcreek	68	32	51.6	4.01	
West Palmdale	......	......	......	0.98	
Westpoint†	......	......	......	4.94	T.
Wheatland†	64	32	47.9	2.40	
Williams *[5]	66	36	50.7	4.10	
Wilmington *[5]	77	40	61.6		
Wire Bridge *[5]	63	30	49.5	3.04	
Yerba Buena L. H.	......	......	......	2.74	
Yreka†	58	24	38.0	3.70	3.0
Yuba City *[5]	61	39	51.7	2.71	
Engineers Quarters ‡	......	......	......	1.98	
Morses House ‡	......	......	......	2.73	
Deep Creek ‡	......	......	......	2.41	
Holcomb Creek ‡	......	......	......	1.82	
Squirrel Inn ‡	......	......	......	2.23	
Colorado.					
Alma†	52	−3	23.2	0.16	......
Antlers†	46	11	28.2	0.36	4.2
Arkins	......	......	......	0.43	3.5
Boxelder	......	......	......	0.08	1.0
Breckenridge†	58	−16	21.2	0.73	7.4
Canyon†	70	12	41.3	0.03	
Castlerock†	59	5	31.7	0.45	4.5
Collbran	......	......	......	1.15	11.5
Colorado Springs†	66	15	36.8	0.07	0.5
Cope†	64	18	38.8	0.33	1.0
Cripple Creek†	71[c]	8[c]	36.0[c]	1.04	1.0
Delta	49	−5	23.0	0.35	3.5
Denver	......	......	......	......	4.6
Downing†	70	18	41.4	0.80	8.0
Dumont *†[5]	60	8	44.4	0.60	6.0
Durango†	53	6	32.2	0.86	9.0
Fleming	......	......	......	T.	
Fort Collins†	66	0	34.0	0.24	3.0
Garnett	......	......	......	0.20	2.0
Gleneyrie†	63	15	38.7	0.13	......
Grand Junction†	49	11	30.1	0.33	4.0
Greeley†	65	3	29.9	0.07	1.0
Gulch†	43	7	27.6	0.56	14.0
Gunnison†	40	−20	14.6	0.50	5.0
Holly	......	......	......	0.57	T.
Hugo (near)	66	11	34.5	0.28	2.0
Husted†	72	7	36.3	0.27	2.0
La Jara	......	......	......	1.00	10.0
Lake Moraine†	54	−2	28.8	0.30	3.0
Lamar†	70	10	37.7	0.65	
Laporte	......	......	......	0.40	4.0
Las Animas†	73	11	37.8	0.70	
Lay†	46	−9	23.8	0.35	3.6
Leadville (near) *†[1]	48	2	23.2	0.80	8.0
Leroy†	60	16	37.2	0.01	T.
Longmont†	65	8	34.5	0.20	2.0
Longs Peak	60	1	30.8[c]	0.15	3.0
Loveland	......	......	......	0.15	1.5
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Meeker†	49	1	25.0	0.47	3.8
Millbrook†	63	−6	28.3	0.70	7.0
Minneapolis†	71	15	41.9	0.67	
Montrose†	50	−2	26.9	0.45	4.5
Moraine†	56	7	33.2	0.30	3.0
Pagoda†	50	−9	24.2	0.95	9.5
Paonia†	......	......	......	0.45	4.5
Parachute†	45	5	24.6	1.20	12.0
Pinkhamton *[5]	48	5	28.3	0.30	3.0
Pueblo	......	......	......	......	1.7
Rangely†	44	−3	22.8	0.15	2.0
Redcliff	......	......	......	0.08	0.8
Rico†	48	2	26.6	1.70	17.0
Rockyford†	72	10	36.2	0.70	
Ruby	......	......	......	3.40	34.0
Saguache†	50	−7	30.8	0.30	3.0
St. Cloud	......	......	......	0.00	
San Luis†	55	−11	23.1	1.40	14.2
Santa Clara *[1]	60	10	32.5	4.95	49.5
Seibert†	......	......	......	0.46	3.5
Smoky Hill Mine†	63	9	33.1	0.20	2.0
Stamford *[1]	58	2	27.0	2.50	25.0
Steamboat Springs†	48	−12	20.6	0.65	6.5
Sulphur Springs†	52	−15	20.6	0.38	8.0
Surface Creek†	56	3	30.2	0.30	3.0
Thon†	69	14	37.9	0.40	4.0
T. S. Ranch†	48	8	28.6	0.57	5.0
Twin Lakes	......	......	......	0.42	3.0
Vilas	......	......	......	1.00	
Wallet†	......	......	......	0.40	
Wray†	70	11	38.1	0.20	T.
Yuma	......	......	......	0.20	......
Connecticut.					
Bridgeport	53	−1	29.0	2.00	17.2
Canton†	54	−11	26.2	1.61	10.0
Colchester	55	−5	28.4	3.07	19.0
Falls Village	......	......	......	2.33	21.0
Greenfield Hill	......	......	......	2.02	16.0
Hartford b	......	......	......	2.11	11.0
Hartford c	52	−5	28.4	......	......
Lake Konomoc	......	......	......	1.50	......
Middletown	54	−13	28.0	2.62	24.0
New Haven	......	......	......	......	17.8
New London†	53	−1	30.6	2.75	19.2
North Grosvenor Dale	49	−13	22.6	3.09	......
Norwalk	52	−10	26.6	0.92	7.5
Southington *[1]	52	−16	25.7	2.03	11.0
South Manchester	......	......	......	2.13	14.0
Storrs	54	−3	25.6	2.67	14.0
Voluntown†	55	−14	28.3	2.20	12.0
Wallingford†	......	......	......	2.41	15.0
West Cornwall†	51	−4	25.0	1.78	23.2
Windsor	51	−9	26.6	2.31	10.3
Delaware.					
Dover†	60	9	33.7	1.51	8.5
Milford	67	12	36.6	1.57	4.5
Millsboro	62	10	35.1	1.77	7.0
Newark	57	7	31.1	0.56	4.5
Seaford†	61	12	34.9	1.01	5.5
District of Columbia.					
Distributing Reservoir *[5]	60	13	36.0	......	......
Receiving Reservoir *[5]	57	11	35.6	......	......
Washington	......	......	......	......	1.0
West Washington	68	12	34.6	0.39	2.1
Florida.					
Amelia†	70	33	52.0	2.99	
Archer†	79	30	55.0	2.85	
Bartow	82	36	60.2	2.11	
Brooksville†	78	37	57.5	1.34	
Clermont†	82	40	60.6	1.07	
De Funiak Springs	76	26	51.1	2.25	
Earnestville†	81	37	59.0	1.26	
Emerson†	79	27	53.2	2.07	
Eustis†	83	35	59.1	1.82	
Federal Point†	79	35	55.6	3.67	
Fort Meade†	83	34	58.6	2.84	
Frostproof *†[1]	83	38	60.4	1.98	
Grasmere†	80	37	58.9	1.75	
Huntington	81	38	58.0	1.23	
Kissimmee†	......	36	......	2.36	
Lake Butler†	77	33	53.2	1.21	
Lake City†	78	32	54.3	3.38	
Lemon City†	86	48	68.5	1.80	
Macclenny†	79	30	53.0	2.50	
Manatee†	80	37	60.4	2.58	
Merritts Island†	80	45	63.3	2.12	
Milton *[1]	72	30	48.5	3.19	
Mullet Key†	75	42	61.2	2.30	
Myers†	83	44	64.2	3.43	
New Smyrna†	80	39	58.0	2.73	
Oakhill *[1]	81	44	62.7	......	
Ocala *†[1]	80	35	56.0	1.49	
Orange City	81	33	59.0	1.40	
Orange Park	74	32	53.6	1.49	
Orlando†	78	38	57.8	1.95	
Oxford *†[1]	80	36	57.5	0.50	
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
Plant City†	84	34	60.0	0.80	
St. Francis†	84	30	58.0	1.31	
St. Francis Barracks	79	35	55.5	2.28	
Tallahassee†	73	30	51.0	5.70	
Tarpon Springs†	78	37	58.6	1.68	
Georgia.					
Adairsville†	67	18	41.1	1.23	
Albany†	70	28	50.4	1.78	
Allentown†	70	20	47.0	5.21	0.5
Americus†	74	20	46.8	4.13	
Atlanta	......	......	......	......	6.2
Augusta	......	......	......	......	1.0
Blakely *†[6]	75	25	50.1	3.11	
Brag†	79	20	47.5	6.86	
Canton†	......	......	......	1.30	2.0
Cedartown	71	17	44.6	0.68	1.1
Clayton†	69	9	44.5	0.86	4.0
Covington	66	12	41.7	1.11	4.0
Dahlonega†	74	15	43.0	0.97	2.0
Diamond†	65	12	39.2	1.71	T.
Dublin	......	......	......	4.86	
Elberton†	75	22	46.6	2.82	7.0
Fleming†	70	23	46.8	7.62	
Gainesville	72	15	41.6	2.02	6.0
Gillsville†	76	19	44.7	0.40	
Hawkinsville	......	......	......	6.20	
Hephzibah *†[6]	68	30	48.8	4.10	
Lagrange†	74	21	48.0	1.69	1.6
Louisville†	74	23	46.6	5.02	0.2
Macon† b	......	......	......	5.01	1.2
Marshallville†	70	24	47.2	4.75	
Milledgeville†	72	26	47.0	4.62	2.0
Monticello *†[1]	70	26	48.3	2.70	3.0
Morgan†	77	22	47.2	5.01	
Newnan†	70	20	45.2	0.95	......
Piscola	77	29	51.8	6.50	
Point Peter *[1] h	68	18	40.9	3.15	6.0
Poulan†	79	23	49.1	4.92	
Quitman†	77	26	50.2	6.68	
Resaca†	......	......	......	0.99	
Rome†	70	19	42.8	1.47	
Talbotton†	72	24	45.4	3.09	
Tallapoosa	70	17	44.0	1.37	2.0
Thomasville†	78	28	50.8	7.67	
Toccoa†	70[f]	20[f]	42.6[f]	1.04	7.0
Washington†	......	......	......	3.80	......
Idaho.					
American Falls	46	15	31.2	1.00	......
Blackfoot†	48	6	29.4	0.46	1.8
Boise Barracks†	55	10	35.8	1.48	T.
Burnside†	51	9	27.8	1.13	......
Chesterfield†	48	−2	25.5	0.68	5.0
Cœur d'Alene	54	11	36.0	......	......
Corral *†[1]	41	−1	25.0	1.30	15.0
Fort Sherman†	51	15	35.0	4.94	3.8
Gimlet†	43	6	25.8	1.66	15.5
Grangeville	57	21	38.1	1.49	6.3
Idaho City	48	12	31.8	3.62	21.7
Idaho Falls	......	......	......	......	6.7
Kootenai†	52	11	31.0	5.04	38.0
Lake†	34	−8	20.0	1.40	14.0
Lewiston a†	59	20	41.4	1.97	3.8
Lost River†	......	......	......	0.44	4.6
Martin†	45	1	23.8	0.20	2.0
Minidoka†	63	−3	31.9	0.37	5.5
Moscow†	57[h]	20[h]	38.4[h]	3.10	......
Murray†	52	18	31.8	4.84	20.0
Nampa	50	13	32.8	1.76	6.0
Ola†	62	14	33.7	4.42	17.0
Paris†	55	2	24.5	0.71	......
Payette†	55	14	34.2	1.20	0.5
Pollock†	55	14	39.6	0.93	......
Rexburg†	44	0	26.1	......	......
Roseberry†	39	−10	26.2	1.99	15.0
Salubria†	48	11	31.6	3.21	14.8
Shoup	47	6	27.2	1.05	......
Soldier†	44	−7	24.3	1.79	9.8
Swan Valley†	44	2	26.4	1.12	9.5
Warren†	50	10	31.4	3.09	......
Yellowjacket†	......	......	......	1.70	17.0
Illinois.					
Albion†	63	12	38.4	0.46	
Alexander†	68	5	36.4	0.22	
Ashton *†[1]	54	6	30.5	0.37	3.6
Atlanta	......	......	......	0.24	
Atwood a *†[2]	64	4	31.7	0.47	T.
Atwood b	......	......	......	0.88	......
Aurora a	58	2	31.5	0.16	......
Aurora b†	58	4	30.8	0.32	2.0
Beardstown†	......	......	......	0.88	T.
Bloomington†	65	4	34.8	0.53	T.
Bushnell†	67	7	36.2	0.22	1.0
Cairo	......	......	......	......	T.
Cambridge	56	10	33.3	0.63	3.5
Carlinville†	65	9	37.4	0.43	T.
Carlyle	......	......	......	0.39	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Illinois—Cont'd.					
Carrollton	65	10	36.5	0.50	T.
Catlin	60	5	31.8	0.50	
Charleston	62	10	36.2	1.08	T.
Chemung *1	53	1	27.9	0.77	5.0
Chester	.....	.....	.....	0.20	
Chicago	.....	.....	.....	.....	1.3
Cisne *†1	64	11	37.6	0.43	
Clearcreek †	57	6	32.2	0.12	T.
Coatsburg †	63	7	36.4	0.66	T.
Cobden †	69	11	40.2	0.89	
Decatur †	64	7	35.8	0.32	T.
Dixon †	58	4	30.6	0.44	3.8
Dwight †	58	1	31.8	0.11	
East Peoria †	63	5	34.7	0.27	T.
Effingham †	63	11	36.8	0.52	
Evanston *10	58	5	32.1		
Fort Sheridan †	55	5	30.6	0.65	5.3
Friendgrove *†1	.....	18	39.6	0.50	
Galva †	59	4	32.0	0.30	2.0
Glenwood *†1	59f	2d	29.8d	0.14	1.5
Golconda †	66	13	39.6	1.29	
Grafton †	.....	.....	.....	0.50	
Greenville †	64	7	37.4	0.82	
Griggsville †	67	12	37.6	0.38	T.
Halliday *3	66d	14d	37.4d	0.89	
Havana †	67	8	36.8	0.33	1.0
Herrin *1	62	16	43.4	0.46	
Hillsboro †	61	10	37.0	0.77	T.
Iron †	65	14	40.0	0.67	
Joliet †	66	8	34.4	0.36	0.4
Jordans Grove †	68	14	39.8	0.22	
Kankakee a †	61	10	33.3	0.17	0.7
Kishwaukee	54	5	28.6	0.23	2.0
Knoxville a *3	63	− 4	34.4	0.38	1.0
Lagrange †	57	6	31.3	0.10	0.8
Laharpe *1	58	8	34.8	0.99	T.
Lanark *†1	54	1	29.0	0.95	.....
Lexington	61	5	34.2	0.15	
Loami †	.....	.....	.....	0.22	T.
Louisville †	65	11	37.7	0.31	
McLeansboro †	65	14	38.9	0.70	
Martinsville †	61	10	36.4	1.41	
Martinton †	64	7	34.0	0.13	T.
Mascoutah *3	68	8	38.8	0.10	
Mattoon *1	60	14	37.7	0.88	.....
Minonk †	58	5	33.9	T.	0.1
Monmouth †	63	3	34.0	0.35	0.4
Morrisonville †	60	8	35.8	0.44	
Mount Carmel †	.....	.....	.....	0.41	
Mount Pulaski	63	9	35.5	0.51	
Mount Vernon	68	20	41.1	0.29	
New Burnside †	66	12	41.1	0.68	T.
Olney a *1	63	10	38.6	0.46	
Oregon †	54	5	29.0	0.30	
Oswego *1	56	4	30.1	0.15	0.4
Ottawa †	58	5	32.0	0.28	0.8
Palestine †	62	12	37.8	0.54	T.
Peoria a †	.....	.....	.....	0.13	
Peoria b †	61	13	36.8	0.40	T.
Philo †	63	2	33.9	0.83	T.
Plumhill *†3	68	16	39.6	0.45	
Rantoul †	63	5	33.9	0.30	T.
Reynolds	59	5	32.2	0.93	2.1
Riley †	52	3	28.3	0.43	3.5
Robinson *†3	61	9	34.1	0.68	
Rockford †	54	8	30.0	0.90	3.5
Rose Hill *†1	66	10	38.9	1.30	
Roundgrove †	58	8	30.6	0.39	
St. Charles *†1	55	5	31.9	0.61	2.0
St. John *†1	63	13	38.0	1.31	
Scales Mound	54	− 4	28.7	1.12	6.0
Springfield	.....	.....	.....	.....	T.
Streator †	59	8	34.2	0.10	0.2
Sycamore †	53	3	28.8	0.55	2.5
Tiskilwa *†3	53	7	30.0	0.17	1.5
Tuscola †	63	6	35.2	0.75	T.
Walnut †	58	6	32.2	0.17	1.8
Wheaton *3	.....	9	29.4	0.55	2.0
Winnebago †	55	6	29.8	0.58	5.0
Zion †	57	3	29.3	1.08	6.3
Indiana.					
Anderson †	59	10	34.5	0.90	T.
Angola *1	60	6	31.8	1.53	8.3
Auburn †	58	− 9	30.8	1.06	2.2
Bloomington †	62	13	37.0	0.90	
Bluffton †	59	7	32.2	1.82	1.0
Bright †	61	13	36.4	1.75	T.
Butlerville †	61	11	36.6	1.35	0.2
Cambridge City †	61	8	33.9	1.79	T.
Columbia City *1	54	5	31.5	1.09	4.2
Columbus †	63	8	36.1	1.05	
Connersville †	60	9	34.1	1.63	T.
Delphi †	63	6	32.7	0.79	T.
Edwardsville *†1	65	12	40.5	1.99	
Evansville †	68	14	39.1	0.90	
Farmland †	59	11	34.7	1.66	0.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Indiana—Cont'd.					
Franklin *1	61	10	36.1	1.13	T.
Greencastle †	59	9	35.2	1.14	T.
Greensburg	.....	.....	.....	1.68	T.
Hammond †	54	5	32.6	0.42	4.0
Huntington	58	10	32.5	1.65	4.5
Indianapolis	.....	.....	.....	.....	0.1
Jasper †	63	13	38.7	1.00	
Jeffersonville	63	15	39.5	2.21	T.
Knightstown †	60	9	34.6	1.42	0.2
Kokomo †	59	10	34.6	1.32	T.
Laconia	64	11	38.5	1.10	
Lafayette †	61	7	34.4	0.78	0.2
Logansport b †	58	11	33.5	0.58	
Madison †	63	14	38.6	1.42	T.
Marengo †	64	13	38.0	1.36	T.
Marion †	58	10	34.1	1.54	0.2
Mauzy †	58	7	33.6	1.43	0.1
Mount Vernon †	67	15	40.3	0.77	
Northfield †	57	8	33.2	1.26	T.
Princeton *†1	63	14	38.3	0.50	
Richmond	58	10	34.4	1.88	T.
Rockville †	60	7	35.4	0.77	T.
Scottsburg	63	14	38.6	1.07	
Seymour †	62	14	36.9	1.63	0.5
South Bend †	61	4	31.9	0.37	3.2
Sunman	57	10	34.3	1.99	0.2
Syracuse †	.....	.....	.....	0.85	5.0
Terre Haute †	61	14	38.9	1.13	T.
Tipton †	58	6	34.2	1.63	
Topeka †	52	− 8	30.3	0.76	5.1
Valparaiso †	60	8	32.2	0.44	3.0
Vevay	65	14	41.3	1.25	
Vincennes †	63	12	37.6	0.38	
Warsaw †	62	8	33.4	1.86	1.0
Washington †	64	13	40.0	0.64	T.
Worthington †	61	11	36.8	0.87	T.
Indian Territory.					
Eufaula †	.....	.....	.....	0.23	
Healdton †	73	8	45.0	2.67	
Lehigh †	78	12	45.8	0.79	
South McAlester	70	10	41.2	.....	
Tahlequah	74	14	46.8	1.12	
Tulsa †	.....	.....	.....	0.90	
Wagoner	70f	17f	44.4f	0.37	
Iowa.					
Adair	.....	.....	.....	0.72	
Afton	56	6	33.3	0.53	T.
Algona *1	50	4	28.5	1.29	6.5
Alta a †	49	4	27.6	0.46	0.5
Amana †	52	9	30.8	0.45	T.
Ames b	55	8	30.6	0.37	0.8
Atlantic †	55	6	31.8	1.23	
Atlantic (near)	52	9	32.6	0.52	T.
Audubon	53	4	31.0	0.99	
Belknap	.....	.....	.....	0.40	T.
Belleplaine	52	8	31.2	0.31	3.1
Bonaparte †	63	6	33.9	1.10	2.0
Carroll	54	1	29.7	0.31	1.8
Cedarfalls †	55	5	30.6	0.10	1.0
Cedar Rapids †	56	3	30.3	0.85	1.8
Chariton	58	8	34.0	0.65	T.
Charles City †	54	2	27.9	0.65	4.1
Clarinda †	58	14	35.8	0.96	0.5
Clinton	56	2	30.6	0.82	3.0
College Springs	64	10	36.0	1.25	
Corning †	64	7	34.6	0.91	T.
Council Bluffs	.....	.....	.....	0.44	T.
Cresco †	47	− 1	24.8	0.67	4.0
Davenport	.....	.....	.....	.....	2.5
Decorah †	48	− 1	27.0	0.67	
Delaware *3	.....	7	27.9	0.94	3.5
Denison †	65	5	32.5	T.	
Des Moines	.....	.....	.....	.....	0.9
Dows	54	1	27.1	0.89	2.5
Dubuque	.....	.....	.....	.....	3.8
Eldora	60	5	30.6	0.30	3.0
Elkader †	56	− 1	28.1	0.65	1.0
Estherville	48	− 3	25.7	0.30	1.0
Fairfield †	60d	6d	34.8d	0.74	0.5
Fayette †	58	0	28.6	1.01	1.2
Fonda	.....	.....	.....	0.44	.....
Forest City	50	− 7	24.9	1.07	8.0
Fort Madison *†1	60	14	36.8	1.00	1.0
Galva †	63	5	30.4	0.17	0.5
Gardengrove	59	4	33.0	0.48	
Glenwood †	57	9	34.0	0.42	
Grand Meadow *1	50	2	27.5	0.78	4.0
Greenfield †	57	4	32.4	0.91	0.8
Grinnell †	55	11	31.4	0.32	T.
Grundy Center	56	5	29.0	0.31	T.
Hampton	52	5	27.7	0.80	1.4
Hopeville †	58	8	33.4	0.40	T.
Humboldt †	52	4	30.2	0.45	3.0
Independence †	53	2	28.2	0.49	1.9
Indianola †	64	12	35.7	0.60	T.
Iowa City a †	66	7	32.2	0.55	2.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Iowa—Cont'd.					
Iowa City b	57	4	33.5	.....	.....
Iowa Falls †	52	7	29.1	0.56	2.2
Keokuk	.....	.....	.....	.....	T.
Knoxville	62	9	33.1	0.52	T.
Lansing	57	1	28.2	0.45	.....
Larchwood	.....	.....	.....	0.14	T.
Larrabee †	51	3	27.8	0.47	1.0
Leclaire †	.....	.....	.....	0.33	1.7
Lemars	48	1	29.1	0.06	
Lenox *1	60	12	34.4	0.61	0.3
Logan †	56	5	31.4	.....	.....
Madrid	57	9	31.7	0.57	2.0
Malvern *1	60	10	32.2	0.46	T.
Maquoketa	54	0	30.5	0.58	4.5
Marshall †	58	9	27.8	0.55	1.0
Mason City †	50	− 1	26.0	0.85	3.5
Mechanicsville	54	7	29.6	1.57	8.0
Millman	.....	.....	.....	0.84	
Monticello *†1	53	8	29.9	0.67	3.3
Mooar	66	6	33.8	0.60	
Mountayr †	59	7	33.6	0.51	T.
Mount Pleasant *1	62	12	35.1	1.35	1.5
Mount Vernon *1	56	8	31.0	0.90	
Neola	55	4	30.4	0.45	
Newton †	57	7	31.5	0.89	1.0
North McGregor †	.....	.....	.....	0.27	2.7
Northwood	55	− 8	27.5	0.90	2.0
Ogden	58	7	31.6	0.47	2.0
Osage *†3	.....	2	24.9	0.83	5.0
Osceola	61	7	34.6	0.50	0.2
Oskaloosa †	63	14	34.8	0.29	T.
Ottumwa	66	8	34.4	1.43	0.4
Ovid †	64	7	34.8	0.72	0.2
Plover	.....	.....	.....	0.75	T.
Portsmouth	67	− 7	34.8	0.40	0.1
Primghar	46	0	27.0	0.18	1.0
Rock Rapids	48	−10	27.2	T.	T.
Sac City †	51	6	29.7	1.25	2.0
St. Charles *1	58	12	32.2	0.25	
Seymour †	60	6	34.0	0.55	T.
Sibley	48	− 2	25.4	0.27	0.7
Sidney	59	12	35.6	0.64	
Sigourney	62	6	32.6	0.60	T.
Sioux City	.....	.....	.....	.....	0.1
Spencer	47	2	26.8	0.36	0.7
Spirit Lake †	45	1	25.8	0.40	1.3
Toledo	59	− 2	29.8	0.90	0.5
Villisca †	56	12	32.9	1.24	1.0
Vinton *1	57	9	31.5	0.78	2.5
Waterloo	55	− 3	28.5	0.45	1.3
Waverly	53	5	28.7	0.27	0.8
Webster City	51	8	29.8	0.46	3.0
Westbend *†1	49	1	27.0	0.85	2.0
Wilton Junction †	56	7	31.2	0.73	4.5
Winterset †	60	9	32.4	0.73	
Kansas.					
Abilene †	66	15	40.0	0.15	
Achilles *1	65h	8	28.3c	0.52	0.2
Altoona *†3	63	14	39.9	0.69	
Anthony	.....	.....	.....	0.60	
Assaria *5	64	12	34.9	T.	T.
Atchison †	69	13	38.0	0.87	T.
Augusta	70	12	40.2	0.36	
Beloit †	62	14	38.2	0.15	T.
Blaine	67	15	38.2	0.33	T.
Campbell	63	16	37.8	0.34	
Colby †	67	9	37.2	0.16	
Columbus †	68	11	40.4	1.14	T.
Concordia	.....	.....	.....	.....	T.
Coolidge †	60	7	38.0	0.42	
Cunningham †	69	10	40.9	0.38	T.
Dodge City	.....	.....	.....	.....	T.
Downs	.....	.....	.....	0.20	T.
Dresden *1	62	10	34.6	0.12	
Effingham	67	16	39.2	.....	
Elgin *1	73	17	39.2	0.27	
Ellinwood †	68	13	40.4	0.27	T.
Emporia *†1	66	19	40.3	0.04	
Englewood †	74	12	41.8	1.40	T.
Eureka †	.....	.....	.....	0.34	
Eureka Ranch †	67	9	37.6	0.15	
Fall River	70	14	41.7	0.49	
Fort Riley †	71	16	40.6	2.60	
Fort Scott †	65	9	38.1	0.86	
Frankfort	72	13	40.7	0.42	
Garfield	.....	.....	.....	0.10	T.
Gibson *5	64	10	37.9	T.	
Goodland	64	13	38.4	0.60	
Gove *†1	68	14	39.0	0.12	
Grainfield *6	80	16	41.7	T.	T.
Grenola *1	72	12	39.8	0.35	
Halstead	62	14	37.5	0.46	
Horton	66	15	38.5	0.70	T.
Hutchinson †	78	22	43.7	0.53	
Independence †	73	15	41.6	0.63	
Lakin †	65	12	40.0	0.40	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lawrence	68	8	39.4	0.47	
Lebo †	66	14	39.4	0.43	
McPherson †	60	12	38.5	0.62	
Manhattan *b*	71	18	39.8	0.26	T.
Manhattan *c*	73	12	39.7	T.	T.
Marion †	67	14	39.8	0.39	
Meade †	......	......	......	0.60	
Medicine Lodge †	72	13	41.0	0.55	
Minneapolis †	65	17	39.4	0.12	T.
Morantown †	66	15	39.6	0.64	T.
Morland	71	9	38.7	0.00	
Morton †	73	15	40.8	0.68	
Mounthope *[1]	68	16	41.6	0.37	
Norton	63	7	34.5	0.00	
Norwich †	77	15	42.4	0.55	
Oberlin †	......	......	......	0.10	
Olathe †	67	13	40.8	0.32	
Osage City †	65	12	39.0	0.22	
Ottawa †	68	11	39.4	0.48	
Paola †	68	12	41.0	1.20	
Phillipsburg †	64	4	37.2	0.62	
Pleasant Dale	......	19	......	0.12	
Powhattan	65	13	38.2	0.90	T.
Pratt	69	4	40.6	0.40	
Rome *†[1]	73	17	41.0	0.70	
Russell †	......	13	......	0.28	
Salina †	68	15	39.0	0.27	
Scott City	67[g]	7[g]	38.8[g]	0.30	
Sedan †	73	13	40.6	0.68	
Sharon Springs *[1]	80	16	40.2	0.75	
Topeka	......	......	......	......	T.
Ulysses †	68[e]	13[e]	38.1[e]	0.30	
Wallace *[1]	68	5	36.2	0.38	
Wamego *[1]	68	16	37.4	0.29	
Wellington *[1]	72	19	43.2	0.62	
White Rock	......	......	......	T.	
Wichita	......	......	......	......	T.
Winfield *[5]	66	14	39.2	0.50	
Winona *[1]	76	18	40.0	0.50	
Yates Center	70	9	38.4	0.65	
Kentucky.					
Alpha †	70	10	43.2	1.60	
Ashland *[1]	67	7	37.2	......	
Bardstown †	65	15	38.2	2.97	
Blandville †	68	14	40.2	0.88	
Bowling Green *a* *[1]	67	12	38.3	1.88	
Bowling Green *b* †	68	17	40.7	1.70	
Burnside †	......	......	......	1.25	
Caddo †	63	13	37.0	1.56	0.2
Canton *†[1]	68	16	42.7	2.61	
Carlisle	......	......	......	2.90	
Carrollton †	64	12	39.4	2.10	T.
Catlettsburg *†[1]	62	15	39.5	1.38	0.5
Earlington	67	18	42.6	1.76	
Edmonton †	66	13	40.1	1.63	T.
Eubank *†[1]	67	7	36.5	1.55	T.
Falmouth †	......	......	......	1.38	
Fords Ferry †	71	14	41.1	1.55	
Frankfort †	64	13	39.6	2.93	T.
Franklin *†[1]	65	17	40.6	2.01	
Georgetown	62	10	38.9	......	
Greensburg †	67	16	41.9	1.64	
Henderson †	67	22	43.5	1.21	
Hopkinsville †	68	17	41.2	1.32	
Leitchfield †	65	12	38.5	3.06	
Lexington *a* *[1]	62	14	39.1	2.21	T.
Lexington *b*	......	......	......	......	T.
Louisa † *a*	59	......	......	1.27	
Louisville	......	......	......	......	T.
Lyndon	66	14	40.3	2.10	
Marrowbone †	66	10	38.2	2.12	
Maysville †	65	15	39.4	2.03	T.
Middlesboro †	64	8	36.6	0.49	
Mount Sterling †	61	8	36.3	1.41	T.
Munfordville *[1]	68	22	42.6	1.15	......
Owensboro †	68	15	39.5	1.76	T.
Owenton †	62	13	37.8	2.35	T.
Paducah *a* †	......	......	......	1.73	
Paducah *b* †	70	18	43.2	2.33	
Pleasure Ridge Park †	68	13	39.3	2.33	T.
Richmond †	62	10	39.1	1.22	T.
Russellville †	73	14	43.8	1.20	
St. John †	64	11	39.0	3.02	T.
Sandyhook	......	......	......	1.50	
Shelbyville †	65	12	38.1	3.11	T.
Southfork †[2]	......	......	......	3.36	
Vanceburg †	64	10	37.3	1.07	
Williamsburg †	67	12	39.1	0.95	
Louisiana.					
Abbeville	82	30	55.0	2.65	
Alexandria †	78	25	49.9	1.81	1.0
Amite †	80	26	53.4	1.50	
Bastrop †	81	24	50.0	0.44	
Baton Rouge †	79	28	52.2	1.69	
Calhoun	75	22	48.3	0.33	
Cameron †	......	......	......	1.03	......

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Louisiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cheneyville †	76	23	48.8	2.01	
Clinton †	75	25	50.8	1.44	
Davis	75	20	52.1	0.54	0.3
Donaldsonville †	80	30	54.3	1.44	
Elm Hall	80	28	50.8	......	
Emilie †	77	30	51.5	3.74	
Farmerville	77	22	48.2	0.80	
Franklin †	74	30	51.8	2.42	
Grand Coteau	77	32	53.5	1.35	
Hammond †	77	27	51.0	2.05	
Houma †	80[d]	29[d]	52.2[d]	4.25	
Jeanerette	78	33	57.0	2.19	
Lafayette †	......	......	......	1.64	
Lake Charles †	80	23	55.2	2.20	T.
Lawrence †	77	35	53.2	3.71	
Liberty Hill	82	23	51.0	1.12	
Mansfield †	78	18	47.8	1.24	
Maurepas	77	27	50.6	2.24	
Melville	......	......	......	2.70	
Minden †	79	20	47.0	0.77	
Monroe †	72	28	48.8	0.51	
Montgomery	78	28	49.8	1.05	
New Iberia	76	30	53.4	2.80	
Oakridge †	80	21	53.2	0.54	
Oberlin	76	27	50.5	3.55	
Opelousas †	78	25	50.9	1.30	
Oxford †	80	21	49.7	0.91	
Paincourtville †	78	29	52.0	3.80	
Plain Dealing †	75	24	50.0	1.08	
Rayne †	80	28	54.7	1.64	
Robeline †	......	......	......	1.81	
Ruston	76	27	51.3	0.83	
Schriever †	80	28	52.2	1.59	
Shellbeach †	75	33	56.0	2.02	
Southern University †	81	32	53.0	4.00	
Sugar Ex. Station †[1]	79*	31	53.4	4.57	
Sugartown †	76	29	52.0	1.90	2.8
Thibodeaux	......	......	......	3.39	
Venice †	75	38	56.0	3.03	
Wallace	77	32	53.0	3.92	
West End	......	......	......	1.79	
White Sulphur Springs †	80	26	52.8	2.63	2.5
Maine.					
Bar Harbor	48	− 5	23.8	2.60	6.0
Belfast *[6]	43	− 2	22.1	1.40	1.0
Calais †	54	−16	22.4	2.39	7.0
Cornish *[1]	44	− 5	22.2	1.50	6.5
Cumberland Mills	49	0	23.6	1.65	....
Eastport	......	......	......	......	4.8
Fairfield	42	−10	19.7	1.17	3.0
Farmington †	43	− 9	19.8	1.15	7.2
Flagstaff †	38	−21	14.3	1.05	10.5
Gardiner	45	− 4	21.9	1.52	2.8
Kineo †	37	− 9	16.5	0.90	10.0
Lewiston	48	1	23.1	1.45	5.4
Mayfield	40[f]	−10[f]	15.6[f]	1.24	12.0
North Berwick	45[e]	− 5[e]	24.2[e]	2.79	5.9
North Bridgton	42	−10	21.8	1.67	13.3
Orono	45	− 9	19.5	1.30	....
Petit Menan *[1]	48	0	24.2	......	....
Portland	......	......	......	......	6.1
Winslow	43	− 8	21.2	1.29	3.8
Maryland.					
Annapolis	59	16	40.1	0.77	6.2
Bachmans Valley	60	3	31.2	1.27	3.5
Baltimore	......	......	......	......	3.2
Boettcherville	......	......	......	1.00	6.0
Charlotte Hall †	70	14	38.4	0.34	1.0
Cherryfields †[2]	......	......	35.7	1.40	2.5
Chestertown †	58	9	33.4	0.86	6.0
Collegepark	63	7	33.5	0.28	2.0
Cumberland *a*	61	9	32.1	0.91	5.0
Cumberland *b*	64	10	36.8	0.94	5.0
Darlington †	69	9	33.0	0.34	3.5
Deerpark	57	− 8	30.1	2.55	12.0
Denton	59	7	34.0	0.83	4.0
Easton †	60	12	34.5	0.98	2.5
Ellicott City	65	12	37.8	0.42	3.0
Fallston *[1]	60	11	33.2	0.40	3.2
Flintstone	......	......	......	0.61	5.0
Frederick *a*	62	5	34.6	0.59	3.0
Grantsville	60	3	30.2	2.22	10.0
Greatfalls *[5]	58	10	34.8	......	....
Greenspring Furnace	63	7	32.9	0.57	2.5
Hagerstown †	64	11	36.0	......	....
Jewell †	63	11	35.6	3.30	1.0
Johns Hopkins Hospital	65	11	34.5	......	....
Laurel	65	6	34.2	0.20	2.0
McDonogh[1]	62	15	37.5	......	....
Mardela Springs †	63	12	33.8	1.41	3.5
Mount St. Marys Coll. †	61	9	33.0	0.56	3.0
New Market	62	5	33.2	0.50	3.0
Pocomoke City	63	14	40.2	......	....
Princess Anne	63	9	34.4	1.27	1.5
Sharpsburg	62	10	33.0	0.52	3.2
Solomons †	64	16	38.4	0.92	1.7

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Sunnyside	59	− 2	28.9	2.71	7.5
Taneytown †	63	4	33.7	0.49	3.8
Van Bibber	58	10	32.2	0.33	.....
Western Port	62	8	32.4	0.67	4.2
Westminster	58	7	35.2	0.30	3.0
Woodstock	63	4	31.4	1.00	3.0
Massachusetts.					
Adams	51	− 7	26.3	......	6.0
Amherst	52	− 9	26.6	0.87	3.0
Andover †	......	......	......	2.34	9.5
Ashland	......	......	......	2.08	9.0
Attleboro	......	......	......	1.11	......
Bedford	55	− 6	27.1	1.77	8.0
Bluehill (summit)	55	0	26.8	1.81	14.0
Bluehill (valley)	57	......	25.6	1.78	......
Boston *a*	......	......	......	1.65	......
Boston (W. B.)	......	......	......	......	8.6
Brockton *a*	55	0	27.9	2.08	17.0
Brockton *c*	......	......	......	2.06	......
Cambridge *a*	59	0	28.3	1.57	......
Chestnut Hill	58	− 3	27.9	1.89	7.2
Clinton *a*	......	......	......	1.15	......
Clinton *b*	60	0	29.2	......	......
Cohasset	......	......	......	2.35	10.0
Concord †	57	−11	25.4	1.70	8.8
Dudley[1]	55*	− 5	25.9	1.62	12.0
East Templeton *[1]	50	− 2	23.6	1.01	6.0
Egg Rock, Nahant	51	2	28.8	......	......
Fallriver	54	− [illegible]	30.8	2.07	13.5
Fiskdale	......	......	......	1.23	10.0
Fitchburg *a* *[1]	51	3	25.1	1.69	5.0
Fitchburg *b*	55	− 1	25.8	1.46	4.5
Framingham	55	− 7	27.3	2.17	......
Groton	53	− 5	24.9	1.81	8.0
Hingham	......	......	......	2.01	10.5
Hobbs Brook	......	......	......	1.97	8.2
Hyannis *†[1]	56	5	34.1	3.00	16.2
Hydepark *[6]	......	− 8	25.0	......	13.0
Lake Cochituate	58	−15	27.0	2.15	......
Lawrence	52	− 4	25.2	1.74	6.8
Leeds	52	−12	24.8	1.04	6.5
Leicester Hill	56	− 1	24.8	1.76	7.0
Leominster	......	......	......	1.59	5.5
Long Plain *[6]	56	−14	28.4	3.67	22.0
Lowell *a*	54	− 6	26.2	2.13	......
Lowell *b*	56	− 7	25.9	......	......
Lowell *c*	57	2	28.3	......	......
Ludlow Center	50	−12	22.4	1.35	5.8
Lynn *a*	54	2	27.2	1.22	......
Mansfield *[1]	58	−14	24.8	2.76	16.0
Middleboro	55	−10	26.3	2.47	18.5
Milton	54	− 4	27.8	1.34	7.0
Monroe	48	− 6	21.2	2.03	11.0
Monson	54	−11	26.4	1.63	6.0
Mount Nonotuck	......	......	......	1.01	4.8
Mount Wachusett	......	......	......	1.80	6.5
Mystic Lake	......	......	......	1.89	......
Mystic Station	......	......	......	1.88	......
Nantucket	......	......	......	......	9.5
Natick *[1]	53	− 8	24.8	2.16	9.0
New Bedford *a*	53	2	29.1	3.61	24.0
New Bedford *b*	55	− 7	29.0	3.63	19.8
North Billerica	56	− 5	27.0	2.30	11.0
Pittsfield	49	− 5	24.0	1.41	4.5
Plymouth *[1]	54	6	30.8	2.95	23.0
Princeton	......	......	......	2.27	8.2
Quinapoxet	......	......	......	2.31	6.5
Roberts Dam	......	......	......	1.58	7.5
Roxbury	57	4	30.0	1.87	12.5
Salem	......	......	......	1.97	9.5
Somerset *[1]	56	− 1	29.8	3.08	24.2
South Clinton	......	......	......	2.31	7.8
Springfield Armory	53	−10	25.2	1.37	12.0
Sterling	......	......	......	2.01	6.5
Taunton *b*	54	− 9	27.3	2.83	21.0
Taunton *c*	53	−17	25.8	3.30	......
Turners Falls	48	− 7	23.7	0.82	4.5
Vineyard Haven	......	......	......	......	12.5
Wakefield †	54	− 3	26.8	1.84	8.0
Waltham	......	......	......	1.24	......
Webster	......	......	......	1.83	13.6
Westboro †	54	−10	26.6	1.63	9.5
Weston	54	− 8	26.4	1.30	10.4
Williamstown *[1]	50	− 6	24.9	1.46	5.2
Winchendon	......	......	......	1.41	5.0
Winchester	......	......	......	2.07	......
Woods Hole	......	......	......	......	22.6
Worcester *a*	53	2	26.1	......	......
Worcester *b*	53	1	27.6	2.25	9.0
Michigan.					
Adrian	57	−16	27.6	1.25	9.6
Alma	55	− 9	27.4	1.13	11.0
Alpena	......	......	......	......	6.6
Ann Arbor	53	− 7	27.6	1.20	8.0
Arbela	51	−12	27.8	0.92	6.8
Baldwin	53	−14	25.4	0.85	10.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Michigan—Cont'd.					
Ball Mountain	52	0	27.6	1.04	7.4
Baraga	53	−9	23.2	1.05	13.0
Battlecreek	59	−6	29.9	0.52	4.4
Bay City *b*	52	3	28.2	0.71	3.5
Benton Harbor	58	8	32.2	1.03	6.0
Benzonia [f]	53	6	29.2	1.27	12.8
Berlin	55	−2	27.1	0.94	7.5
Berrien Springs	60	5	31.6	1.35	10.0
Big Rapids	48	−8	26.3	1.22	8.0
Birmingham	54	0	28.5	0.93	6.3
Boon	53	0	24.6	1.21	10.9
Bronson	58	−7	30.2	0.46	4.0
Calumet	46	−2	24.2	1.40	16.8
Camden	51	−5	27.8	1.25	10.5
Carsonville	53	3	26.8	0.72	7.0
Charlevoix	48	9	29.0	1.20	12.0
Cheboygan	45	3	25.6	0.95	7.0
Clinton	60	−13	27.3	1.30	11.5
Detroit					7.4
Escanaba †	44	−7	23.7	1.05	12.0
Fairview	54	5	26.7	0.91	5.2
Fitchburg	46	−16	26.6	1.36	13.5
Flint	58	−20	26.3	0.51	7.7
Gaylord	49	−2	22.3	0.64	6.5
Gladwin	50	−7	25.8	1.00	10.0
Grand Haven					9.4
Grand Rapids *b*	58	4	30.6	1.34	8.0
Grape	60	−6	29.3	1.17	12.2
Grayling	48	−5	23.8	1.08	10.0
Hanover	60	−18	28.3	1.03	9.5
Harrison	53	−4	24.6	0.98	7.7
Harrisville	48	3	26.6	0.85	7.0
Hart	58	0	30.4	1.56	10.7
Hastings	55	−7	29.8	0.85	5.8
Hayes	45	9	27.8	0.46	8.0
Hesperia	52	4	27.2	1.91	8.9
Holland * [9]	48	12	33.4		
Howell	57	−14	26.8	0.87	6.5
Humboldt	48	−13	17.8	1.78	3.0
Ionia	58	−14	28.6	0.80	7.3
Iron River	44	−15	17.8	1.03	9.8
Ivan	49	4	24.8	0.87	5.8
Jeddo	53	−1	26.7	1.34	12.2
Kalamazoo	58	−4	29.8	0.87	4.5
Lansing	59	−7	27.7	0.72	9.0
Lapeer	57	−7	28.6	0.58	3.0
Lathrop	46	−12	20.6	2.00	20.0
Lewiston	47	−4	24.4	0.69	
Ludington	49	7	29.8	0.86	3.2
Luzerne	51	1	23.1	0.88	9.8
Mackinaw City	49	3	26.8	0.36	5.0
Madison	56	−14	27.9	1.48	12.4
Mancelona	51	0	25.0	1.74	15.0
Manistee	52	6	29.3	0.76	7.0
Manistique	43	−1	24.9	1.04	11.5
Marquette					14.4
Mayville	57	−3	27.6	1.09	9.5
Middle Island * [10]	43	11	29.4		
Midland	56	2	26.6	0.67	2.0
Mottville	59	−12	29.4	0.52	4.0
Mount Clemens	41	−2	25.4	0.97	5.0
Mount Pleasant *b*	55	−6	26.8	0.67	6.1
Muskegon	50	10	30.6	0.64	4.0
Newberry	44	−5	21.6	0.95	4.5
North Marshall	57	−13	28.2	0.77	3.0
Northport	49	13	29.7	1.25	12.5
Old Mission	47	7	28.6	1.10	11.0
Olivet	57	−5	29.1	0.78	9.2
Ovid	55	−10	27.9	0.92	7.0
Owosso	57	−13	27.5	1.12	10.4
Parkville				0.82	5.0
Petoskey	47	0	27.0	0.58	4.9
Plymouth	58	−8	27.6	0.86	9.0
Pontiac	55	−6	27.8	0.75	6.0
Port Austin	46	6	27.6	1.23	9.5
Port Huron					8.9
Powers	47	−9	23.0	1.05	10.0
Reed City	51	−12	25.4	0.64	10.5
Rockland	52	−14	22.2	0.80	3.5
Rogers City	47	2	25.0	0.78	8.2
Romeo	56	2	27.6		
Saginaw	58	4	28.1	1.07	3.1
St. Ignace	48	−3	25.6	1.30	5.5
St. Johns	50	−2	29.6	1.09	12.8
Sandbeach *a*	54	4	28.2		
Saranac	59	−12	28.6	1.30	10.2
Sault Ste. Marie					8.6
Sidnaw	44	−12	20.4	0.86	9.0
Somerset	58	−7	27.4	1.12	9.8
South Haven	59[c]	5[c]	31.9[c]	0.91	7.0
Stanton	55	−7	27.2	0.57	5.5
Sturgeon Point * [10]	47	5	28.4		
Thomaston	48	−23	19.7	1.46	17.6
Thornville	56	0	29.0	0.64	8.5
Traverse City	50	5	29.6		
Vandalia	56	1	32.7	0.93	6.8

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Michigan—Cont'd.					
Waverly	52	−12	28.3	1.11	6.6
Wetmore	43	−8	20.6	2.23	20.0
Ypsilanti	56	−5	28.9	1.19	9.4
Minnesota.					
Ada †	39	−35	13.6	0.53	7.0
Albert Lea †	50	−4	24.0	0.80	8.0
Alexandria †	45	−17	17.3	0.55	5.5
Beardsley †	46	−20	20.1	0.76	2.8
Belleplaine * [1]	40	−8	21.0		
Bermidji	32	−24	17.2		
Bird Island	43	−10	21.1	0.25	2.5
Blooming Prairie †	47	−5	24.6	1.62	11.2
Caledonia †	46	−2	25.9	0.56	5.2
Cambridge †	46			0.64	6.2
Camden	47	−9	25.0	0.10	0.5
Collegeville	47	−12	22.4	0.36	3.4
Crookston †	39	−32	12.6		
Dawson * [1]	49	−13	21.0	T.	T.
Detroit City	44	−40	14.6	0.30	
Duluth					9.1
Farmington †	44	−13	20.6	1.40	10.5
Fergus Falls †	40	−25	17.4	0.75	7.5
Glencoe †	45	−10	22.8	0.32	
Glenwood †	43	−13	18.4	0.44	3.5
Grand Meadow †	47	−2	24.4	0.57	3.7
Grand Portage	40	−15	16.9	0.87	T.
Granite Falls	44	−9	22.4	0.39	T.
Lakeside †	46	−10	21.8	0.62	3.7
Lake Winnibigoshish * [1]	42	−38	16.6	0.79	7.7
Lambert †	42	−34	10.3	1.25	10.0
Lawrence †	46			0.50	5.0
Leech Lake [1]	46*	−44	14.6	0.88	8.0
Lesueur * [1]	50	−8	24.2	0.63	2.5
Long Prairie †	47	−23	19.5	0.59	6.2
Lutsen	44	−22	20.9		
Luverne †	46	0	26.8	0.41	1.2
Mapleplain	45	−13	21.4	1.00	7.9
Mazeppa [1]	52*	−10	23.7	0.90	8.0
Milan †	44	−17	19.1	0.79	5.5
Minneapolis *a* †	44	−12	22.4	0.83	4.7
Minneapolis *b* [1]	46*	−10	23.3	0.75	4.8
Minneapolis (W. B.)					4.2
Minnesota City * † [1]	47	0	27.5	0.63	5.0
Montevideo †	47	−13	21.7	0.48	0.2
Moorhead					7.1
Morris	43	−15	19.2	0.24	1.1
Mount Iron	46	−32	15.8	1.70	17.0
New London	40	−12	18.0	0.05	T.
New Richland * [14]	48	−4	24.3		
New Ulm †	49	−4	24.8	0.37	2.0
Park Rapids †	40	−40	15.4	0.71	7.1
Pine River * [1]	49	−35	16.7	0.58	7.3
Pleasant Mounds †	49	−4	24.8	0.86	2.0
Pokegama Falls [1]	46*	−51	13.6	1.04	11.2
Reeds †				0.70	7.0
Rolling Green	45	−4	24.0	1.10	6.0
Roseau	40	−36	11.9	0.68	3.8
St. Charles †	49	−4	24.7	0.85	6.5
St. Cloud	40	−10	30.0	T.	T.
St. Olaf	43	−20	18.4	0.55	7.5
St. Paul					7.8
St. Peter				0.05	0.5
Sandy Lake Dam [1]	45*	−41	16.7	0.83	7.8
Shakopee [6]	42*	−9	24.5		5.0
Tower †	45	−47	13.8	0.60	6.0
Two Harbors †	47	−14	23.2	1.17	10.2
Wabasha * [1]	47	−5	25.2	0.92	8.5
Willmar †	40	−12	20.2	0.45	2.3
Winona	47	0	26.9	0.53	3.7
Worthington	44	−8	24.2	0.12	1.2
Zumbrota [1]	48*	−11	25.6		
Mississippi.					
Agricultural College	71	21	47.9	1.00	
Austin †	74	16	45.2	0.52	
Batesville †	75	20	47.0	0.65	
Bay St. Louis	76	32	53.2	1.78	
Biloxi †	76	30	52.6	3.08	
Briers †	80	28	50.6	2.12	
Brookhaven †	81	23	49.9	1.90	
Canton †	74	23	49.8	0.66	
Columbus *a* †				1.06	
Columbus *b*	72	21	47.1		
Crystal Springs †	77	23	50.0	0.94	
Edwards	74	25	50.0	1.32	
Enterprise [b]	78	21	49.5		
Fayette †	80	24	50.0	1.55	
French Camps †	88	17	46.6	0.66	
Fulton †	72	18	44.4	1.43	
Greenville *a*	70	26	46.3	0.29	
Greenville *b* †	77	24	46.8	0.17	
Hazlehurst † [c]	79	24	49.3		
Holly Springs	70	20	43.0	2.82	
Jackson †	74	20	46.8	1.32	
Kosciusko †	74	22	49.0	T.	
Lake	74	23	48.2	0.18	
Leakesville †	88	23	51.8	2.62	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Mississippi—Cont'd.					
Logtown †	76	31	51.6	3.31	
Louisville †	80	19	49.8	0.37	
Macon †	76	21	46.5	0.31	
Magnolia †	79	25	51.5	4.57	
Mayersville	76	21	51.2	0.75	
Meridian †	78	22	48.3	0.87	
Mosspoint	76	30	51.7	2.00	
Natchez †	80	26	52.1	2.25	
Okolona †	72	19[c]	44.9	1.06	
Palo Alto †	74	24	47.6	0.89	
Pontotoc	81	22	49.5	1.01	
Poplarville	77	22	50.0	4.35	
Port Gibson †	78	22	49.2	1.32	
Rosedale †	74	18	45.3	0.20	
Stonington * [1]	76	26	52.0		
Thornton †	78	28	51.5	1.00	
Topton * [5]	74	28	52.0	1.35	
Water Valley * † [1]	73	19	45.6	0.31	
Waynesboro *a*	75	21	45.7	1.60	
Woodville †	75	27	51.8	2.93	
Yazoo City †	78	20	47.9	0.62	
Missouri.					
Akron				0.55	T.
Appleton City	69	11	40.0	1.49	T.
Arthur * † [3]		22	37.8	1.02	T.
Avalon	65	10[d]	35.9[d]	1.00	T.
Bethany	62	18	39.2	0.71	T.
Birchtree	73	8	39.9	0.57	
Bolckow †				0.62	T.
Boonville †				1.88	
Brunswick	66	4	35.4	1.09	
Carrollton †	67	14	38.6	1.15	
Cedargap * [1]	71	14	40.0	0.71	
Columbia					T.
Conception	63	12	37.4	0.61	T.
Cowgill * [5]	68	10	36.1	0.86	T.
Darksville †	64	8	36.2	1.00	
Downing				0.87	0.5
East Lynne * [3]		16	37.1	1.19	T.
Edgehill * [5]	62	10	36.0	0.58	
Eightmile * [1]	66	10	39.0	1.17	0.2
Elmira	78	6	37.9	0.90	T.
Emma * [3]		10	36.8	1.10	
Farmersville				1.07	T.
Fayette	71	11	37.4	1.29	0.2
Fulton				1.00	T.
Gallatin * [1]	63	12	38.0	0.92	
Glasgow	70	12	38.6	1.07	
Gordonville * [3]		15	35.4	1.19	
Gorin * [3]	79	12	34.8	1.04	
Grovedale	68	5	39.9	0.98	
Halfway	68	12	40.8	1.00	T.
Hannibal					0.2
Harrisonville †	64	5	37.4	0.75	T.
Hermann †				0.97	
Houston	71	10	41.2	0.70	
Houstonia				1.11	1.0
Humansville	71	11	40.9	0.95	T.
Irena				0.74	T.
Ironton †	73	7	38.2	0.46	T.
Jefferson City †	70	18	39.9	1.20	
Kansas City					T.
Kidder	66	11	37.0	0.89	0.3
Lamar †	67	15	40.0	1.40	
Lamonte				1.36	
Lebanon	73	14	42.2	1.15	
Lexington †	65	11	39.2	1.09	
Liberty	67	12	38.6	0.72	T.
McCune * † [1]	62	10	38.3	0.73	0.5
Mansfield				1.30	
Marblehill	71	10	38.3	1.05	
Marshall †	68	8	37.2	1.16	T.
Maryville	64	−5	34.0	0.02	T.
Mexico †	70	9	38.2	0.90	T.
Mine La Motte †	72	10	39.8	0.22	
Mineralspring	75	13	44.6	0.59	T.
Montreal * [1]	68	13	38.2	1.74	T.
Mount Vernon	74	12	40.9	0.47	0.5
Neosho	70	12	41.6	0.44	T.
Nevada				0.73	T.
New Haven * [1]	65	10	41.2	0.45	
New Madrid	70	17	43.3	0.98	
New Palestine * † [1]	72	19	42.4	1.28	T.
Oakfield	67	14	40.4	0.68	
Oakmound				0.49	
Oakridge * [4]		18	38.3	0.76	
Olden †	76	11	41.6	0.23	
Oregon *a*	65	15	39.2	0.94	0.3
Oregon *b* * [1]	65	15	36.9	0.82	T.
Osceola †				3.90	T.
Oto				0.40	
Palmyra * [5]	64	10	37.0	0.85	T.
Phillipsburg * † [1]	68	15	39.0	1.30	T.
Pickering * [3]		18	36.8	0.93	0.2
Platte River * [3]	62	12	34.1	0.09	T.
Poplar Bluff	72[c]	13[c]	43.8[c]	0.66	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	Ins.	Ins.
Potosi				0.43	
Princeton *[1]	64	12	36.1	0.78	T.
Rhineland	67	12	39.2	0.97	
Richmond	65	13	39.0	0.83	T.
Rolla				1.12	
St. Charles	69	11	38.8	0.47	
St. James *[3]		14	38.9		
St. Joseph †				0.02	T.
St. Louis (V. O.)	68	11	38.0	1.06	T.
St. Louis (W. B.)					T.
Sarcoxie *[3]	62	13	38.4	0.75	T.
Shelbina				1.00	
Sikeston	72	12	43.2	0.45	
Springfield					T.
Steffenville				1.21	T.
Stellada †	71	10	39.4	1.58	T.
Sublett	63	12	35.0	1.50	0.5
Trenton	62	12	35.8	1.00	
Unionville †	59	9	32.8	0.70	0.7
Virgil City				1.15	T.
Warrenburg *[1]	70	20	42.3	0.98	T.
Warrenton	69	11	37.7	0.90	
Wheatland				1.50	T.
Willow Springs	77	9	41.9	0.87	
Zeitonia *[1]	71	10	41.2	0.62	
Montana.					
Agricultural College	51	22	35.0	0.39	3.6
Augusta †	63	5	38.2	0.10	1.0
Bigtimber †	64	15	40.7	0.08	0.8
Billings †	75	−5	44.0	0.22	2.2
Boulder	50	15	31.6	T.	T.
Bozeman †	50	19	33.6	0.40	4.0
Butte †	52	12	32.3	0.37	3.7
Chinook †	60	−19	31.0	0.30	3.0
Choteau †	59[4]	−10[4]	35.2[4]	0.05	0.5
Cokedale †[c]	58	18	36.3	0.10	1.0
Deer Lodge	60	12	33.0	0.22	
Fort Custer †	58	−10	33.4	0.00	
Fort Keogh †	55	−14	29.2	0.50	T.
Fort Logan †	62	−20	31.7		
Fort Missoula	59	5	31.3	0.50	3.8
Glasgow †	47	−24	20.4	T.	T.
Glendive †	47	−20	25.6	0.30	3.0
Greatfalls †	57	−3	37.4	0.15	1.4
Harlem	58	−15	33.6		
Havre					1.6
Helena					0.5
Hogan †	64	−6	38.0	0.21	0.1
Kalispell	56	−5	32.3	0.54	2.0
Kipp †	54	−13	31.8	0.37	2.6
Lewistown †	54	16	36.9	T.	T.
Libby †	63	7	32.8	3.02	16.0
Livingston †	63	20	38.2	T.	T.
Manhattan †	50	9	30.2	0.11	1.0
Martinsdale †	48	2	33.8	0.10	1.0
Marysville †	49	12	33.4	0.55	4.5
Miles City					0.7
Poplar †	52	−24	20.6	T.	T.
Radersburg	50	−8	21.3		
St. Ignatius Mission †[c]	59	19	36.5	0.34	1.0
St. Pauls †	55	−10	33.4	T.	T.
Sun River				0.01	0.1
Troy	56	11	32.1	3.49	8.6
Utica †	56	−15	35.2	0.00	
Virginia City †	48	16	32.4	0.25	2.5
Wibaux †		−9		0.10	1.0
Yale †	52	−4	34.0	0.20	2.0
Nebraska.					
Agee *[1]	56	0	31.4	T.	T.
Albion †				0.21	
Alliance *[1]	58	6	31.5	0.00	
Ansley †	61	−1	34.2	0.02	0.2
Arapaho *[1]	60	4	33.5	0.00	
Arborville *[1]	61	10	37.5	0.16	T.
Ashland *a* †	60	9	35.1	0.35	0.8
Ashland *b* *[1]	57	10	34.6	0.36	T.
Ashton	60	7	34.2	0.16	T.
Auburn *†[1]	66	12	38.5	0.55	T.
Aurora *[1]	70	12	35.5	T.	
Bassett	59	2	33.5	0.25	T.
Beatrice †	58	−1	35.5	0.48	
Beaver City †	64	7	38.1	0.14	
Benkelman *[1]	64	4	34.3	0.15	
Bluehill *[1]	60	10	36.2	0.30	
Bratton *[1]	60[c]	12	35.6[c]	0.50	T.
Brokenbow *[1]	60	2	37.4	0.20	2.0
Burchard				0.00	
Burwell *[1]	56	−4	31.2	T.	
Callaway †	61	5	36.0	T.	
Central City *[5]	58	12	37.8	0.14	
Chester *[1]	60	15	35.7	0.17	
Columbus †	57	7	33.8	0.03	T.
Cornlea				0.22	
Creighton †	54	7	28.9	0.12	
Crete	59	10	35.4	0.52	1.0
Culbertson				T.	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	Ins.	Ins.
Curtis *a*	70	8	38.4	0.52	
Curtis *b* †				0.50	
David City *†[1]	55	7	34.3	0.25	T.
Divide				0.22	
Dunning				0.24	
Edgar *[1]	58	10	36.6	T.	T.
Ericson *†[1]	52	−4	30.2	0.25	T.
Ewing †				1.00	
Fairbury †	61	15	36.8	0.40	
Fairmont *†[1]	58	11	37.3	0.20	T.
Filley				0.45	
Fort Robinson	63	−1	36.3	0.00	
Franklin †	65	10	36.6	0.00	
Fremont †	52	12	33.5	0.41	
Geneva †	69	10	37.2	0.19	
Genoa	57	10	34.2	0.27	0.5
Gering †	65[c]	10[c]	36.0[c]	T.	
Gibbon				0.50	
Gothenburg	61	7	34.9	T.	T.
Grand Island *b*	59	8	35.1	0.14	0.2
Greeley	52	−6	31.3	0.15	T.
Haigler *[1]	62	10	34.7	0.52	
Hartington †	51	−10	28.6	0.23	1.0
Harvard *[1]	58	10	34.2	0.06	T.
Hastings *[1]	56	10	35.3	T.	T.
Hayes Center				0.30	1.0
Hebron †	58	12	37.0	0.26	T.
Hickman				0.45	
Holdrege *b* *[1]	62	8	35.2	T.	T.
Imperial *a* †	64	7	36.6	0.35	
Indianola *[1]	65[1]	8[1]	32.2[1]	T.	T.
Kearney				0.54	0.2
Kennedy	67	−2	33.0	0.30	
Kimball †	62	15	38.0	0.00	0.5
Kirkwood *[1]	55	3	29.0	0.08	
Lexington †	67	5	35.6	0.20	
Lincoln *b* †	59	8	36.6	0.29	0.3
Lincoln *d*	62	10	34.6	0.40	T.
Lodgepole †	64	7	34.2	T.	T.
Loup *a* *[1]	60	8	33.3	0.08	T.
Loup *b* *[1]	60	8	33.7	T.	
Lynch *†[1]	55	6	30.8	0.05	0.5
Lyons				0.24	T.
McCook *[1]	63	8	35.2	T.	T.
McCool				T.	
Madison *[1]	59	10	31.0	0.16	0.5
Madrid *[5]	65	−2	35.2	0.40	
Marquette				0.12	T.
Milford				0.52	
Minden *a* *[1]	60	6	34.7	0.09	0.1
Minden *b*				0.11	
Nebraska City *b* *[1]	61	15	37.0	0.55	
Nemaha *[1]	64	14	32.6	0.55	
Nesbit †	60	−3	34.4	0.80	3.0
Norfolk †	58	6	31.2	0.15	T.
North Loup †	57	5	33.4	T.	
Oakdale †	55	3	30.7	0.07	0.3
Odell *[5]	58	18	38.4	0.38	
Omaha					0.5
O'Neill †	59	−8	31.2	0.10	1.0
Ord	60	6	33.6	T.	
Osceola				0.10	
Ough †				0.25	
Palmer *a* *[1]	60	10	32.5	0.35	1.0
Plattsmouth *a* †				0.56	T.
Ravenna *a*	63	6	35.2	0.14	0.2
Redcloud *a*				0.25	
Redcloud *b* *[1]	54	10	34.4	0.00	
Republican *[1]	60	8	35.7	T.	
Rulo *[1]	64	15	35.0	0.90	
St. Libory	62	8	35.5	0.16	0.2
St. Paul	60	12	36.6	0.10	
Salem *[1]	60	20	40.0	0.70	
Santee Agency †	55	5	31.2	0.05	0.8
Schuyler				0.00	
Seneca *[1]	66	0	36.8	0.24	
Seward *[5]	56	10	37.0	0.47	
Stanton *[1]	51	8	30.9	0.16	0.2
State Farm	59	10	34.0	0.31	
Strang *[1]	60	10	37.5	0.18	T.
Stratton				0.10	
Stromsburg				0.23	
Superior *[5]	64	12	35.6	0.00	
Sutton	60	10	36.6	0.11	0.5
Syracuse				T.	T.
Tecumseh *b* †	70	10	35.4	0.45	
Tekamah	58	−3	32.3	0.30	
Thedford *[1]	62	10	32.6	0.80	T.
Turlington †	52	7	31.4	0.44	T.
Valentine †	59	−6	34.0	0.46	
Wakefield				0.21	0.8
Wallace *[1]	53	11	31.7	0.50	
Weeping Water *[1]	58	10	32.0	0.38	T.
Whitman				0.50	
Wilber *[1]	66	14	38.2	0.45	
Willard				0.27	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	Ins.	Ins.
Wilsonville *[1]	60	8	34.4	0.00	
Wisner				0.40	
Woodlawn				0.35	
York *[1]	50	12	35.3	0.21	
Nevada.					
Austin	53	15	37.4	0.48	0.5
Battle Mountain *[1]	60	14	34.4	0.20	
Beowawe *[1]	56	10	33.9	0.00	
Candelaria	73	20	43.4	0.50	5.0
Carlin *[1]	56	4	29.6	0.50	5.0
Carson City	63	15	58.0	0.70	1.9
Carson City (W. B.)					1.6
Cloverdale *[1]	64	20	35.1	0.05	0.2
Clover Valley				4.15	8.0
Cranes Ranch				0.38	3.5
Darrough Ranch				0.23	
Downeyville	69	19	44.0	0.30	1.0
Duckwater	56	8	31.2	T.	T.
Elko *[8]	55	10	36.3	0.45	2.5
Elko (near)	50	4	26.4	T.	T.
Ely	56	4	30.6	0.23	2.3
Empire Ranch	56	40	33.9	0.10	2.8
Fenelon *[1]	54	15	30.6	0.55	5.5
Golconda *[1]	54	18	32.4	0.10	
Halleck *[1]	55	5	29.5	0.22	1.0
Hawthorne *a* *[8]	60	26	40.9	0.09	
Hawthorne *b*	64	20	41.0	9.09	
Hot Springs *[1]	55	17	36.4	T.	
Humboldt *[1]	58	17	35.6	T.	T.
Lewers Ranch	64	19	39.8	2.11	5.5
Los Vegas	60	25	42.8	0.38	
Lovelock *[1]	62	18	36.5	0.20	2.0
Midas	57	18	39.7	0.47	4.8
Mill City *[1]	60	18	36.7	0.02	0.2
Osceola	64	18	40.2	0.06	2.0
Palisade *[1]	56	13	33.2	0.27	2.8
Palmetto	61	3	35.8	1.20	12.0
Reese River				0.09	0.9
Reno *[8]	62	20	39.7	T.	
Reno State University	60	15	37.3	0.31	0.1
Ruby Valley				0.48	5.9
St. Clair	50	14	35.9	0.00	
St. Thomas	66	20	43.0	6.30	
San Antonio		8		0.06	
Sodaville	68	13	40.6	0.20	
Stofiel	46	−10	26.8	1.01	10.5
Tecoma *[1]	50	13	28.6	0.10	1.0
Toano *[1]	54	12	31.6	0.55	5.5
Tybo	53	11	33.2	0.34	3.0
Verdi *[1]	60	17	38.3	1.60	2.0
Wadsworth *[1]	62	10	33.9	0.05	0.5
Wells	46	9	31.5	0.30	0.5
Winnemucca					T.
New Hampshire.					
Alstead *[6]	40	−6	20.9	0.88	1.5
Berlin Mills	46	−20	14.0		2.5
Bethlehem	44	−12	17.0	0.98	6.0
Brookline *[1]	52	−16	25.9	1.78	7.0
Concord	49	−6	23.8	0.96	1.0
Durham	53	−4	26.0	1.76	3.5
Grafton †	48	−7	21.0	0.81	2.0
Hanover	45	−5	21.0	0.71	2.0
Keene	49	−0	22.6	0.81	2.0
Lancaster	42	−19	15.8	1.20	10.3
Nashua	54	−11	24.2	1.87	9.0
Newton †	54	−2	24.9	1.48	3.0
North Conway	48	−12	21.0	1.90	10.0
Peterboro	49	−12	22.3	1.33	4.6
Plymouth	44	−8	19.8	1.07	5.0
Sanbornton †	44	−4	21.3	0.84	2.0
Stratford	49	−16	18.8	0.96	10.0
Warner				0.93	3.5
West Milan	48	−15	15.9	1.37	11.8
New Jersey.					
Allaire	61	5	33.3		3.0
Asbury Park	52	5	30.1	1.52	14.0
Atlantic City					4.3
Barnegat	64	7	36.8	1.09	8.0
Bayonne	58	3	32.0	1.64	13.0
Belvidere	53	−4	29.2	1.03	6.5
Beverly †	62	4	31.4	1.25	10.8
Billingsport *[1]	54	10	30.7	1.38	9.0
Blairstown	50	−2	29.5	0.87	5.5
Boonton	54	−4	28.6	1.48	10.0
Bridgeton	59	11	34.2	1.61	8.0
Cape May	58	14	36.4	1.80	5.0
Cape May C. H. †	61	12	34.6	1.15	4.0
Charlotteburg	58	−8	29.8	1.40	8.0
Chester	55	4	28.2	1.55	9.0
Clayton	61	1	31.2	0.96	14.5
College Farm †	57	−3	30.5	1.59	12.1
Deckertown	55	−10	29.0	1.22	6.0
Dover	58	−6	27.9	1.08	10.0
Egg Harbor City	60	−2	30.8	1.11	4.5
Elizabeth †	52	−10	30.0	2.60	22.5
Englewood	56	−12	28.4	1.92	16.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins	Ins.
New Jersey—Cont'd.					
Franklin Furnace	54	− 8	26.8	1.31	8.0
Freehold	59	2	31.4	0.93	10.0
Friesburg	.....	.....	.....	0.71	8.2
Gillette	57	−11	27.9	2.04	15.0
Hammonton	.....	.....	.....	1.65	12.5
Hanover	53	− 9	28.8	1.40	10.5
Hightstown	57	1	31.0	1.66	14.0
Imlaystown	58	4	31.4	1.60	13.8
Junction	.....	.....	.....	1.05	5.5
Lambertville	56	− 3	30.8	1.53	12.0
Moorestown	64	3	32.0	1.25	12.5
Newark *a*	56	2	31.7	1.67	13.0
Newark *b*†	57	3	31.7	1.72	16.8
New Brunswick *a*	58	− 4	31.7	1.67	12.5
New Brunswick *b*	57	− 4	30.4	1.65	12.6
Newton	55	− 4	28.3	1.24	5.5
Ocean City	60	10	35.5	1.55	6.6
Oceanic	59	10	34.5	1.87	15.8
Paterson	58	4	32.7	1.48	13.0
Perth Amboy	57	3	31.0	1.80	11.0
Plainfield	59	− 1	30.7	1.44	15.1
Rancocas	.....	.....	.....	1.51	13.0
Readington*[6]	60	2	36.1	.....	.....
Rivervale	54	−15	27.8	3.70	22.0
Sergeantsville*[1]	54	3	30.8	1.38	10.0
Somerville	58	−14	28.4	1.02	13.0
South Orange	59	0	29.9	1.83	16.0
Staffordville	.....	.....	.....	0.94	8.0
Toms River	61	0	30.3	0.93	8.0
Trenton	59	6	36.9	1.73	12.0
Vineland	60	− 5	30.9	0.88	8.0
Woodbine	61	3	30.0	1.18	8.0
New Mexico.					
Albert†	67	22	42.1	3.25	
Albuquerque†	58	18	37.1	0.38	
Aztec†	55	10	31.5	0.66	T.
Bernalillo†	58	.....	.....	0.21	
Bluewater†	57	4	29.7	0.30	3.0
Buckman	50	1	23.6	0.68	8.5
Chama†	67	4	32.8	1.80	18.0
Clayton	80	20	45.5	2.20	
Deming*[8]	76	22	48.6	0.00	
East Lasvegas†	66	16	35.8	0.51	0.8
Eddy	74	22	46.4	0.82	
Engle†	62	17	37.6	0.26	
Espanola†	55	10	32.9	0.53	5.0
Estalina Springs	60	14	.....	0.15	1.3
Fort Bayard	68	12	42.0	0.10	1.0
Fort Union	72	11	40.0	0.88	0.8
Fort Wingate	69	5	35.0	0.15	1.5
Galisteo†	55	9	33.9	0.78	
Gallinas Spring†	67	16	39.2	1.24	
Gila	65	15	41.5	0.37	T.
Hillsboro†	63	21	41.9	0.02	
Labelle†	55	0	28.0	2.04	19.0
Las Cruces†	70	11	42.7	T.	
Lordsburg*[8]	60	24	43.2	0.15	
Los Lunas†	60	13	36.1	0.40	
Lower Penasco†	72	20	44.0	0.40	T.
Monero†	48	1	26.0	1.13	8.0
Ocate†	62	9	34.9	1.16	9.0
Olio	55	5	31.6	.....	T.
Puerto de Luna†	70	16	42.2	2.05	
Raton†	70	15	40.2	0.25	2.5
Rincon†	72	20	43.6	0.01	
Roswell†	74	14	*43.8	0.64	
San Marcial†	67	16	40.3	T.	T.
Santa Fe	.....	.....	.....	.....	4.0
Shattucks Ranch [j]	73	18	43.0	0.67	T.
Socorro†	58	20	37.6	0.02	
Springer†	64	5	34.3	2.10	4.0
Valley Ranch	67	10	38.6	0.58	1.5
White Oaks†	60	12	37.8	1.12	7.5
New York.					
Adams	.....	.....	.....	1.65	.....
Addison	57	− 4	28.8	0.88	5.7
Akron	.....	.....	.....	1.26	.....
Albany	.....	.....	.....	.....	5.0
Alfred	54	− 6	25.5	1.64	12.4
Angelica†	53	− 7	25.7	1.23	6.0
Appleton	53	8	29.6	1.11	11.0
Arcade	51	− 1	25.8	1.66	9.8
Atlanta	.....	.....	.....	0.85	.....
Avon	55	− 5	27.8	0.78	.....
Baldwinsville	56	− 3	26.3	1.79	3.3
Bedford	58	−12	28.5	2.18	17.7
Big Sandy*[10]	50	− 6	23.7	.....	.....
Binghamton†	56	− 6	26.9	1.20	6.0
Binghamton W. B.	.....	.....	.....	.....	5.7
Bolivar	55	− 4	26.8	1.38	6.0
Boyds Corners	.....	.....	.....	2.72	14.0
Brentwood	53	− 9	28.6	2.70	17.0
Brooklyn	53	6	31.5	1.70	12.0
Buffalo	.....	.....	.....	.....	3.4
Canton†	49	−17	11.8	0.80	8.0
Carmel	52	− 7	25.8	2.10	13.0
New York—Cont'd.					
Catskill	49	− 9	26.6	1.35	6.5
Charlotte*[10]	50	8	28.2	.....	.....
Cherry Creek	.....	.....	.....	2.97	.....
Cooperstown†	53	− 7	24.0	1.21	8.5
Cortland	56	− 9	26.2	2.32	.....
De Kalb Junction	.....	.....	.....	0.91	.....
Demster	.....	.....	.....	3.82	.....
Eagle Mills	.....	.....	.....	0.35	.....
Easton	.....	.....	.....	1.20	.....
Elmira†	60	− 1	30.0	0.61	.....
Fleming	59	0	27.4	0.40	4.0
Fort Niagara†	56	10	31.0	0.56	1.0
Franklinville	52	−11	26.6	1.61	9.3
Friendship	55	− 7	27.4	1.40	5.9
Fulton	.....	.....	.....	2.29	.....
Glens Falls	46	− 6	22.4	1.29	1.5
Gloversville	54	− 9	23.3	1.67	7.1
Haskinsville	.....	.....	.....	0.99	.....
Honeymead Brook	49	−11	24.2	1.47	5.7
Humphrey†	56	4	28.2	1.62	10.8
Ithaca	58	− 3	27.7	1.00	3.6
Jamestown	54[e]	0[e]	26.6[f]	2.63	18.0
Kings Station	.....	.....	.....	1.17	.....
Lake George	48	− 4	23.8	1.06	1.5
Lebanon Springs	48	−11	23.6	0.91	7.5
Lockport	54	7	30.3	1.35	4.4
Lowville	50	−18	20.2	1.46	14.0
Lyons	55	4	29.0	1.64	7.5
Madison Barracks†	50	−10	22.2	1.61	4.8
Manhattan Beach†	54	6	30.6	1.46	12.0
Mohonk Lake	51	0	27.2	1.90	9.5
Mount Morris	.....	.....	.....	1.50	8.0
Newark Valley	.....	.....	.....	1.22	.....
New Lisbon	65	−15	23.0	0.95	8.0
New York	.....	.....	.....	.....	12.6
Niagara Falls	.....	.....	.....	1.09	.....
North Hammond†	50	− 8	22.8	1.02	4.7
North Lake	44	−20	18.4	2.70	16.0
Number Four†	46	−15	18.5	2.59	17.4
Ogdensburg	50	−12	22.9	1.06	9.3
Oneonta	55	− 5	28.5	0.96	.....
Oswego	.....	.....	.....	.....	19.6
Oxford	53	−11	24.0	1.72	6.2
Palermo†	49	−10	23.6	2.36	11.8
Perry City	54	− 8	25.4	1.40	8.0
Pine City	.....	.....	.....	0.88	.....
Pittsford	55	3	29.0	2.04	10.0
Plattsburg Barracks†	48	− 5	19.2	0.87	T.
Port Jervis	54	− 8	27.5	1.14	7.5
Potsdam	49	−12	20.2	0.83	6.0
Poughkeepsie	52	− 8	23.2	1.67	6.5
Primrose	54	− 9	28.2	1.47	14.0
Ridgeway	.....	.....	.....	0.89	.....
Rochester	.....	.....	.....	.....	13.9
Rome	50	−10	22.2	2.52	.....
Romulus	58	− 2	28.6	2.08	5.0
Rose	.....	.....	.....	2.07	.....
St. Johnsville	48	−10	24.1	1.19	5.5
Saranac Lake	46	−20	16.1	1.44	14.8
Setauket†	56	8	32.8	1.62	11.0
Sherwood	.....	.....	.....	1.06	.....
Skaneateles	.....	.....	.....	1.44	.....
South Canisteo	56	− 5	27.1	1.14	4.2
Southeast Reservoir	.....	.....	.....	2.03	14.0
South Kortright†	52	−11	23.6	1.37	.....
Straits Corners	54	− 6	25.0	1.43	6.5
Tyrone	.....	.....	.....	1.08	.....
Wappingers Falls	50	−20	25.6	1.93	12.5
Warwick	.....	.....	.....	1.22	.....
Watertown	51	−10	23.0	1.48	.....
Watkins	.....	.....	.....	1.06	.....
Waverly†	69	−10	28.6	1.01	5.3
Wedgwood	62	− 2	26.4	1.42	7.5
Westfield	57	9	31.9	1.36	13.5
Westpoint†	53	− 2	27.6	1.63	10.7
Willetspoint	57	6	31.6	0.50	0.4
North Carolina.					
Asheville†	65	10	38.6	0.84	
Beaufort†	68	23	47.2	5.77	
Biltmore†	66	11	38.2	0.70	0.2
Bryson City†	.....	.....	.....	1.02	
Chapelhill†	68	11	39.0	2.23	7.0
Charlotte	.....	.....	.....	.....	11.0
Edenton†	65	19	41.2	3.11	8.0
Experimental Farm	64	16	41.4	1.96	7.0
Fairbluff†	.....	.....	.....	3.46	2.5
Falkland	.....	.....	.....	4.15	8.0
Fayetteville†	68	14	41.4	3.45	8.5
Greensboro†	68	13	41.8	1.34	
Greenville	.....	.....	.....	2.82	
Henderson†	69	12	39.6	2.85	.....
Highlands	59	4	36.4	1.21	4.0
Horse Cove†	63	13	40.4	1.29	4.6
Jacksonville†	67	13	42.8	5.33	
Lenoir*†[1]	62	15	38.1	1.80	2.0
Linville†	55	5	33.1	1.62	
North Carolina—Cont'd.					
Littleton†	65	7	38.8	3.76	10.0
Louisburg†	63	9	37.4	2.91	9.0
Lynn*†[2]	69		38.5	1.02	5.5
Marion	71	15	42.1	1.85	2.5
Mocksville	71	15	42.2	1.54	7.0
Moncure†	66	10	39.6	1.68	9.0
Monroe†	65	5	41.5	2.37	12.0
Morganton*†[1]	65	16	36.6		
Mountairy†	64	11	37.4	1.22	1.0
Mount Pleasant	66	5	40.0	1.52	9.0
Murphy†				1.16	
Newbern†	72	24	48.5	4.29	.....
Oakridge†	66	12	38.9	1.67	4.0
Pantego				4.30	
Pittsboro†	68	10	37.9	1.94	8.0
Raleigh (W. B.)					7.5
Rockingham†	67	11	41.7	2.29	8.0
Roxboro†	65	7	38.2	2.01	6.0
Salem†	71	7	38.8	1.72	6.0
Salisbury†	68	12	40.9	1.50	7.0
Saxon†	66	8	37.4	0.58	3.0
Selma	65	15	40.0	4.75	11.0
Settle	70	12	38.2	2.08	4.8
Skyuka	68	18	44.6	0.60	0.1
Sloan†	66	15	43.4	4.53	0.2
Soapstone Mount†	74			1.80	10.5
Southern Pines *a*†	68	14	43.8	2.98	10.0
Southern Pines *b*	68	15	42.2	2.45	11.0
Southport†	67	19	46.3	4.14	
Springhope*[1]	61	4	36.9	3.30	12.0
Tarboro	67	6	39.8	4.36	8.0
Wash Woods†				2.95	2.0
Waynesville†	63	8	37.7	0.79	
Weldon†	63	8	38.3	3.91	9.0
Willeyton	63	11	39.1	3.40	8.0
North Dakota.					
Amenia	37	−31	13.4	0.35	3.0
Bismarck					0.2
Buxton	36	−28	13.6	0.56	.....
Churchs Ferry	40	−28	13.2	0.70	6.5
Coalharbor†	42	−22	17.2	0.94	9.4
Dickinson†	43	−18	21.7	0.15	1.5
Ellendale	42[l]	−16[l]	22.4[l]	0.10	T.
Falconer	46	−30	18.0	0.06	0.0
Fargo†	41	−33	12.6	0.26	2.6
Formant*.	50	−28	15.2		
Fort Yates†	52	−19	20.6	0.30	3.0
Gallatin†	40	−33	14.4	1.22	6.2
Glenullin	43	−20	26.0		
Grafton†	39	−30	12.1	0.60	5.0
Grand Rapids†	39	−26	16.6	0.59	3.9
Hamilton	40	−33	11.4	1.02	4.3
Jamestown†	44	−20	17.4	0.32	2.7
Kelso	44	−30	13.3		
McKinney	40	−35	13.3	0.30	3.0
Mayville	45	−24	16.2	0.35	2.0
Medora†	48[e]	−20[e]	27.4[e]	0.00	0.0
Milton†	37	−30	12.0	0.55	5.5
Minto†	38	−30	18.5[f]	0.32	3.2
Napoleon†	37	−30	16.2	0.20	2.0
New England City†	52	2	30.6	0.10	1.0
Oakdale†	53	−16	27.2		
Portal†	40	−26	13.2		
Power†	40	−33	16.2	0.25	2.5
Sheyenne	42	−28	13.4	1.60	6.0
Towner†	40	−30	12.8		
University†	42	−27	14.6	0.55	5.5
Valley City†[6]	38	−11	15.2		
Wahpeton†	45	−22	18.9	0.15	1.5
White Earth[c]	40	−35	15.2	T.	T.
Wildrice†[2]			14.6	0.54	5.4
Williston					1.0
Willow City†	45	−31	11.6		
Woodbridge†	41	−28	12.6	0.57	5.7
Ohio.					
Akron	55	8	31.8	3.04	8.4
Annapolis	56	0	31.6	1.83	T.
Ashland	54	4	30.4	2.81	9.0
Ashtabula	62	12	31.7	1.90	10.5
Atwater				3.00	6.0
Auburn	46	2	27.0	1.71	6.0
Bangorville	56	4	30.2	3.01	8.0
Basil				1.63	T.
Bellefontaine	57	− 4	32.2	1.54	0.2
Bement				2.14	7.0
Benton Ridge	59	−15	31.2	2.70	9.8
Bethany	60	13	38.0	1.31	
Bigprairie	57	0	30.8	2.65	7.0
Binola	57	10	33.6	2.31	10.5
Bissells	51	10	30.6	1.60	12.0
Bladensburg	55	− 2	30.6	2.47	5.0
Bloomingburg	62	10	35.9	1.05	0.5
Bowling Green	59	−13	29.5	2.44	10.0
Cambridge	58	− 2	31.4	1.81	4.0
Camp Dennison	59	14	36.7	1.28	0.3
Canal Dover	57	0	30.5	3.28	6.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Canton †	57	8	32.3	3.01	5.8
Carrollton	55	0	31.8	2.42	7.0
Cedarville	......	......	......	2.34	1.0
Celina	62	10	37.5	2.01	2.5
Cherryfork	63	5	34.6	1.74	T.
Cincinnati	......	......	......	......	0.3
Circleville	60	12	36.2	0.44	0.0
Clarksville	59	11	35.6	1.35	0.3
Cleveland *a*	54	15	33.2	2.04	8.5
Cleveland *b*	58	12	32.8	1.35	9.1
Cleveland (W. B)	......	......	......	......	9.9
Clifton	58	8	33.7	1.46	0.3
Coalton	63	10	34.8	1.13	0.5
Colebrook	59	4	29.0	1.59	6.5
Columbus	......	......	......	......	1.1
Dayton *a*	58	11	36.2	1.44	0.7
Dayton *b* †	......	......	......	0.89	T.
Defiance	56	− 9	30.0	1.64	8.6
Delaware †	57	− 1	33.6	2.12	5.0
Demos	57	6	32.4	1.64	0.5
Dupont	56	8	32.1	1.83	10.0
Elyria	54	5	31.3	2.37	3.9
Fairport Harbor *[10]	60	16	34.4	......	......
Fayetteville	57	12	35.2	1.18	0.6
Findlay	60	− 4	30.6	2.55	0.7
Fostoria	57	− 7	30.4	3.11	8.0
Frankfort	60	12	35.0	0.43	T.
Garrettsville †	56	− 2	30.3	2.31	7.1
Granville	58	3	32.2	2.73	4.0
Gratiot	59	4	33.3	1.18	2.1
Greenfield	58[e]	13[e]	36.0[e]	0.74	T.
Greenhill	57	− 4	29.6	2.42	7.1
Greenville	55	9	32.8	1.82	0.2
Hackney	......	......	......	2.33	4.0
Hanging Rock	64	7	36.6	1.00	T.
Hedges	60	−14	30.2	3.00	11.8
Hillhouse	58	8	29.6	1.97	16.0
Hillsboro †	63	10	35.8	1.09	T.
Hiram	54	10	30.0	2.43	8.0
Hudson	56	5	30.5	1.82	......
Jacksonboro	60	11	35.2	1.35	......
Kenton †	60	− 3	32.6	2.19	0.9
Killbuck	55	3	31.1	3.12	9.0
Lancaster	58	12	33.8	1.05	T.
Leipsic	62	− 3	28.8	2.55	8.5
Levering	......	......	......	2.92	1.2
Logan	65	7	33.2	0.84	0.2
Lordstown	56	7	30.2	3.00	7.5
McArthur	58	9	34.6	0.99	T.
McConnelsville †	65	7	34.9	1.13	2.5
Marietta *a* †	......	......	......	1.60	T.
Marietta *b*	62	10	35.8	1.70	T.
Marion	60	− 5	31.8	1.87	7.8
Medina	56	− 1	30.7	2.38	7.0
Milfordton	56	− 2	29.0	2.93	6.0
Milligan	62	4	33.4	0.92	2.0
Millport	......	......	......	2.52	5.2
Montpelier	57	−13	28.6	1.67	11.0
Napoleon	56	−11	29.2	2.43	8.5
Neapolis	......	......	......	1.76	8.5
New Alexandria	57	6	33.2	2.55	6.0
New Berlin	55	2	30.2	2.58	6.0
New Bremen	59	5	32.4	1.51	......
New Comerstown	56	− 4	31.6	1.79	6.5
New Holland	60	11	34.6	0.68	0.5
New Moscow	......	......	......	2.28	5.5
New Paris	62	9	35.8	1.90	T.
New Waterford	......	......	......	2.46	5.0
North Lewisburg	59	5	32.4	1.60	1.0
North Royalton	55	10	30.9	1.91	7.0
Norwalk	63	0	32.2	1.50	6.0
Oberlin	50	10	31.7	1.03	5.1
Ohio State University	58	5	33.1	1.80	0.9
Orangeville	53	1	28.9	1.95	6.0
Ottawa	57	− 9	33.2	2.72	10.5
Pataskala †	58	4	33.3	1.80	1.3
Perry	......	......	......	2.02	9.0
Philo	59	9	33.8	0.86	2.0
Plattsburg	56	8	33.4	1.37	T.
Pomeroy	59	10	35.3	0.86	0.3
Portsmouth *a* †	......	......	......	1.17	T.
Portsmouth *b*	67	11	39.1	1.19	0.1
Richwood	......	......	......	1.96	3.6
Ridgeville Corners	57	−10	29.6	1.59	9.0
Ripley	59	10	36.7	1.84	......
Rittman	58	2	30.7	3.85	5.2
Rockyridge	60	− 6	30.4	1.55	9.2
Rosewood	56	5	32.6	1.60	T.
Sandusky	......	......	......	......	5.1
Sharon Center	55	12	34.2	2.50	8.0
Shenandoah	56	1	30.4	3.15	9.1
Sidney *b*	55	6	31.2	2.24	0.5
Sinking Spring †	59	10	36.0	1.01	0.2
Springboro	......	......	......	0.80	0.0
Spring Valley	57	11	33.4	1.69	......
Strongsville	......	......	......	2.96	11.7

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Sylvania	58	−11	28.2	1.31	9.0
Thurman	65	8	36.7	0.65	0.0
Tiffin †	56	− 4	32.2	2.82	8.0
Toledo	......	......	......	......	7.3
Upper Sandusky	58	− 4	32.0	2.59	8.5
Urbana	53	8	32.6	1.10	0.5
Vanceburg	63	8	36.4	1.00	T.
Van Wert	58	− 4	31.4	1.94	3.8
Vermilion	59	8	31.9	2.25	10.5
Vickery	59	− 5	32.3	2.02	7.9
Walnut	......	......	......	0.93	1.2
Warren	54	4	30.6	3.39	10.0
Warsaw	51	−11	29.6	0.77	5.5
Wauseon	59	−12	29.9	1.84	12.1
Waverly	63	11	36.4	1.04	T.
Waynesville	56	10	33.5	1.67	0.5
Westerville	57	2	34.0	2.01	2.0
Willoughby	......	......	......	2.44	10.0
Wooster *a*	56	1	30.8	3.04	9.2
Youngstown	53	5	28.4	2.38	6.0
Oklahoma.					
Alva †	75	12	43.6	1.25	
Anadarko †	78[j]	11[j]	43.5[j]	1.90	
Arapaho †	74	12	42.8	2.85	
Beaver †	64[i]	13[i]	35.6[i]	0.98	
Burnett †	78	9	43.8	1.11	
Clifton †	72	9	41.2	0.71	
Edmond	70[e]	20[e]	44.1[e]	1.09	
Fort Reno †	87	13	44.3	1.30	
Fort Sill	76	16	45.3	2.75	
Guthrie †	65	17	41.2	1.30	
Hennessey †	77	......	......	0.98	
Keokuk Falls	74	14	44.4	0.90	
Mangum †	83	13	48.0	3.55	
Norman †	74	15	44.9	1.31	
Pondcreek †	81	12	46.0	0.48	
Prudence †	76	12	44.0	1.69	
Sac and Fox Agency †	76	10	44.3	0.70	
Stillwater †	74	13	43.4	0.85	
Winnview †	73	15	44.4	1.26	
Oregon.					
Arlington *[8]	53	13	37.7	1.44	
Ashland *b*	61	23	42.0	3.49	2.5
Aurora *[8]	62	34	48.8	9.40	
Aurora (near)	60	30	43.2	8.43	
Baker City	......	......	......	......	4.2
Bandon	61	32	50.2	6.69	
Bay City †	66	29	47.7	12.71	
Brownsville *[8]	60	32	46.8	4.88	
Burns †	49	8	29.6	0.60	6.0
Cascade Locks	48	18	39.8	14.85	
Comstock *[8]	60	32	45.5	9.29	
Corvallis *a*	61	25	43.4	7.81	
Dayville †	62	25	44.2	1.52	T.
Eugene † *a*	61	30	45.2	5.81	
Falls City	......	......	......	16.29	
Fife †	54	15	36.2	0.81	5.0
Forest Grove	59	26	42.6	10.45	
Fort Klamath	46	10	32.8	6.22	27.0
Gardiner	61	36	48.7	13.59	
Glenora	55	30	41.8	30.05	2.0
Government Camp	60	14	36.8	14.77	33.0
Grants Pass *a* †	62	32	42.8	6.88	
Happy Valley	55	14	36.8	0.74	2.3
Irvington	......	......	......	7.16	
Jacksonville	58	24	40.8	5.28	T.
Joseph	50	12	32.0	1.13	11.0
Junction City *[8]	70	33	47.0	7.49	
Lafayette *[8]	58	31	45.2	7.41	
Lakeview †	47	17	34.1	1.45	14.0
Langlois	67	36	53.8	16.21	
McMinnville †	58	32	43.6	11.13	
Merlin *[8]	68	30	41.7	5.72	
Monmouth *[8]	60	32	44.9	7.80	
Mount Angel †	62	32	44.3	8.62	
Nehalem	......	......	......	19.81	
Newberg	69	30	44.7	11.65	
Newport	58	35	48.4	13.46	
Pendleton	62	9	39.7	1.84	6.8
Riddles *[8]	60	32	43.9	4.81	
Salem *b* †	63	32	44.8	8.31	
Sheridan *[8]	60	33	45.8	8.85	
Silverton *[8]	60	32	44.1	9.62	
Siskiyou *[8]	52	33	42.6	6.85	35.0
Sparta	47	18	34.2	5.85	41.0
Springfield *[8]	69	29	45.4	5.77	
Stafford	59	28	43.0	10.82	
The Dalles †	53	14	38.3	2.74	2.5
Tillamook Rock L. H	......	......	......	9.45	
Toledo	59	29	46.2	12.00	
Umatilla	......	......	......	1.07	......
Vale	45	14	31.8	1.74	6.0
Vernonia	55	28	42.4	10.35	
West Fork *[8]	62	32	44.7	9.45	
Weston	59	9	37.8	2.35	
Williams	60	23	42.0	7.14	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania.	°	°	°	*Ins.*	*Ins.*
Altoona	60	13	36.6	0.89	......
Aqueduct	64	3	32.5	0.63	2.5
Bethlehem	......	......	......	0.70	......
Blooming Grove	52	− 7	25.4	1.18	8.0
Brookville †	......	......	......	1.84	5.6
Browers Lock	......	......	......	0.69	......
Cameron	......	......	......	1.22	4.0
Canonsburg	67[e]	7[d]	36.8[e]	1.23	......
Carlisle	63	8	31.6	0.70	4.0
Cassandra	56	8	31.4	1.46	7.0
Cedarrun	......	......	......	0.85	T.
Centerhall †	58	6	30.2	1.63	4.5
Chambersburg †	63	2	31.0	0.48	2.0
Coatesville	64	4	32.0	0.59	4.5
Confluence †	60	− 2	29.6	1.98	7.0
Coopersburg	65	3	34.2	1.04	5.5
Davis Island Dam †	......	......	......	1.72	......
Derry Station	60	7	32.4	1.53	5.0
Doylestown	......	......	......	1.07	......
Driftwood	......	......	......	0.91	2.0
Dubois	......	......	......	1.98	8.0
Duncannon	......	......	......	0.65	3.5
Dyberry †	56	−13	25.0	0.91	7.0
East Bloomsburg	......	......	......	0.61	0.4
East Mauch Chunk	63	− 5	29.1	1.21	4.5
Easton	51	0	30.1	0.49	5.0
Edinboro *[1]	48	10	28.3	......	8.0
Ellwood Junction †	......	......	......	1.83	5.0
Emporium	56	− 1	29.4	1.82	7.2
Erie	......	......	......	......	8.9
Farrandsville	......	......	......	1.23	3.5
Forks of Neshaminy *[1]	52	2	30.3	1.12	10.0
Frederick	......	......	......	0.56	......
Freeport †	......	......	......	1.84	4.0
Gettysburg	62	4	32.0	0.60	3.5
Girardville	......	......	......	1.20	4.5
Grampian	54	0	28.5	1.82	9.0
Greensboro †	61	− 5	32.1	1.40	2.0
Hallstead †	58	− 7	27.0	0.99	8.2
Hamburg	56	1	32.0	0.97	5.0
Harrisburg	......	......	......	......	2.7
Hollidaysburg	63	− 3	30.6	1.31	5.0
Huntingdon *a* †	64	3	31.2	0.77	2.5
Huntingdon *b*	......	......	......	0.76	3.0
Indiana [j]	67	9	38.0	0.90	......
Irwin	67	12	37.0	1.76	5.0
Johnstown †	58	5	32.1	2.04	8.0
Karthaus	......	......	......	1.10	......
Keating	......	......	......	1.06	3.0
Kennett Square	61	9	32.5	0.56	5.0
Lancaster *c*	56	5	30.6	......	2.5
Lansdale	......	......	......	0.75	......
Lawrenceville	54	− 5	27.6	......	4.0
Lebanon	59	− 5	31.0	0.68	3.1
Leroy †	55	0	25.6	0.79	4.4
Lewisburg	62	− 6	29.6	1.29	4.0
Lock Haven *a* †	62	− 2	32.2	1.42	4.0
Lock Haven *b*	......	......	......	1.02	3.0
Lock No. 4 †	......	......	......	1.46	4.0
Lycippus	61	8	32.3	1.31	4.8
Mifflin	......	......	......	1.05	3.5
Oil City †	......	......	......	2.10	6.3
Ottsville	......	......	......	1.89	......
Parker †	......	......	......	1.68	5.0
Philadelphia *b*	62	10	34.4	0.95	8.5
Philadelphia (W. B.)	......	......	......	......	8.7
Pittsburg	......	......	......	......	3.2
Point Pleasant	......	......	......	1.25	......
Pottstown	56	5	32.2	0.63	2.5
Quakertown	59	− 5	29.5	0.79	9.5
Reading [2]	......	......	29.8	0.40	......
Renovo *a*	......	......	......	0.74	3.3
Renovo *b*	60	5	29.8	0.86	3.5
Ridgway †	......	......	......	1.35	6.5
Saegerstown	56	−10	28.8	2.01	10.0
St. Marys	53	0	27.5	1.76	6.5
Salem Corners	53	2	27.6	1.09	5.9
Scranton	57	− 2	28.8	......	......
Seisholtzville	......	......	......	0.83	......
Selinsgrove	48	− 1	27.6	0.73	3.0
Shawmont	......	......	......	2.00	18.0
Shinglehouse	64	− 4	29.0	2.00	6.0
Sinnamahoning	......	......	......	......	......
Skippack	62	0	28.8	1.13	8.0
Smethport	57	− 2	28.2	1.85	5.5
Smiths Corners	......	......	......	0.82	......
Somerset	50	3	28.5	2.62	13.0
South Bethlehem	54	4	31.4	......	4.0
South Eaton	61	− 4	29.2	1.11	5.5
State College	60	5	30.8	1.04	2.5
Sunbury	......	......	......	1.50	4.0
Swarthmore	57	9	31.6	1.60	10.0
Towanda	60	− 6	28.1	0.57	3.0
Uniontown	62	10	35.0	1.61	2.0
Warren †	55	− 2	29.4	1.68	7.0
Wellsboro †	65	− 2	29.2	0.95	4.5

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
West Chester	58	9	22.6	0.59	4.8
West Newton †	......	......	......	1.62	4.5
White Haven	58	−8	26.9	0.92	5.5
Wilkesbarre †	57	4	30.4	1.06	4.0
Williamsport	50	4	30.2	0.89	3.5
York †	60	3	31.6	0.45	3.3
Rhode Island.					
Block Island	......	......	......	......	16.6
Bristol	52	4	30.5	1.39	12.5
Kingston	55	3	28.2	2.17	13.0
Lonsdale	......	......	......	2.40	13.5
Narragansett Pier	......	......	......	......	9.5
Pawtucket	56	−5	29.6	2.05	13.0
Providence *a*	54	3	30.3	2.87	12.0
Providence *c*	54	3	29.3	2.32	11.5
South Carolina.					
Anderson †	......	......	......	2.48	6.4
Batesburg †	78	21	47.5	1.10	5.0
Blackville †	70	19	44.1	4.71	
Camden †	......	......	......	4.05	2.0
Central †	70	15	41.6	0.78	5.5
Cheraw *a* †	67	11	39.2	2.13	8.0
Cheraw *b* †	......	......	......	3.36	9.0
Clemson College	72	12	41.4	1.59	8.0
Columbia	......	......	......	......	3.4
Conway †	......	......	......	5.91	
Darlington (near)	......	......	......	2.15	2.5
Edisto †	......	......	......	6.42	*
Effingham †	......	......	......	2.80	2.5
Florence †	65	15	41.4	3.17	
Georgetown †	68	22	45.8	4.50	
Gillisonville †	76	17	46.8	5.98	T.
Greenville †	72	11	40.4	2.23	10.5
Greenwood	67	20	42.0	2.89	6.0
Kingstree *a* †	69	20	42.6	4.21	
Kingstree *b* †	......	......	......	4.23	
Little Mountain	73	17	47.1	2.61	4.5
Longshore †	69	18	43.2	3.24	8.0
Mount Carmel †	......	......	......	4.63	4.2
Pinopolis *[1]	65	19	44.8	5.19	
Port Royal †	67	28	49.0	3.16	
St. George †	70	20	44.4	6.46	
St. Matthews †	74	19	44.3	3.38	......
St. Stephens †	......	......	......	4.82	
Santuck †	66	8	40.2	3.03	15.0
Shaws Fork *[1]	80	21	46.1	2.35	1.5
Smiths Mills †	......	......	......	5.81	
Society Hill †	68	19	42.7	2.11	4.0
Spartanburg †	73	18	42.4	1.55	
Statesburg †	68	22	44.7	3.19	1.0
Trenton	66	26	46.3	3.31	2.5
Trial †	83	17	46.8	5.54	
Walhalla	70	13	41.8	0.55	4.0
Winnsboro	70	12	42.9	4.04	5.5
Yemassee †	72	21	45.7	5.91	
Yorkville	70	18	43.9	2.01	10.0
South Dakota.					
Aberdeen †	41	−20	15.9	0.50	T.
Alexandria †	45	−6	23.1	T.	T.
Armour †	50	−5	27.2	0.00	
Ashcroft †	58	0	33.5	0.00	
Brookings	41	−10	22.0	0.25	......
Castlewood †	40	−15	19.2	T.	T.
Chamberlain †	53	0	28.9	0.26	
Cross †[a]	64	12	36.2	0.00	
Edgemont	......	......	......	0.03	......
Faulkton *a* †	41	−19	20.2	T.	
Flandreau †	49	−7	23.3	0.04	
Forestburg †	42	−10	27.7	0.10	T.
Forest City †	50	−16	23.7	0.00	
Fort Meade †	71[d]	−5	41.2	0.06	0.5
Gary †	47	−10	23.5	0.35	
Goudyville *†[1]	41	−10	22.3	0.38	......
Greenwood †	57	4	33.1	0.12	0.4
Hotch City †	43	−6	23.5	0.14	0.5
Howard †	43	−16	22.3	0.30	0.2
Huron	......	......	......	......	0.9
Kimball †	46	−7	24.6	0.25	0.4
Leslie †	56	−12	28.3	T.	
Mellette †	40	−21	19.0	0.30	0.5
Menno †	50	2	27.9	0.29	0.2
Mitchell †	46	−5	25.1	0.00	
Nowlin †	71	−18	32.5	T.	
Oelrichs †	64	6	35.4	0.10	1.0
Parker †	45	−3	26.2	0.00	
Parkston †	49	2	27.9	T.	
Pierre	......	......	......	......	0.1
Plankinton †	45	−1	22.7	T.	T.
Rapid City	......	......	......	......	0.1
St. Lawrence †	42	−10	23.5	0.30	1.0
Silver City	......	......	......	0.02	0.2
Sioux Falls †	44	−4	25.9	T.	
Spearfish †	65	3	39.5	T.	
Tyndall †	50	−7	30.1	T.	
Vermillion [4]	55	6	31.3	......	......
Watertown †	42	−10	19.6	0.30	T.
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Webster †	42	−23	17.0	1.21	4.8
Wentworth †	42	−7	22.6	0.28	1.0
Yankton †	55	4	30.4	0.10	......
Tennessee.					
Andersonville *[1]	65	12	39.1	0.34	
Ashwood *†[1]	67	20	43.6	1.60	
Benton (near) †	69	14	40.6	0.69	
Bluff City †	......	......	......	1.30	
Bolivar †	69[e]	15[e]	42.0[e]	1.09	
Bristol †	65	8	34.2	1.60	
Byrdstown	68	12	40.2	1.37	T.
Cagle *[1]	64	17	39.3	1.16	
Carthage †	......	......	......	1.77	
Charleston †	......	......	......	0.86	
Charlotte	......	......	......	1.88	
Clarksville	69	18	42.0	0.94	
Clinton †	......	......	......	0.67	
Decatur †	65	14	40.1	0.78	
Elizabethton †	68	12	37.6	1.56	
Elk Valley *[1]	66	14	37.8	0.69	
Fairmount *[1]	60[f]	15	39.1[e]	1.33	
Florence †	66	17	41.8	1.72	
Franklin	66	18	41.1	......	
Greeneville †	65	13	37.9	1.41	
Harriman	63	12	38.7	0.41	
Hohenwald †	70	11	40.4	2.14	
Jackson †	60	17	42.2	1.45	
Johnsonville †	66	12	41.8	1.46	
Jonesboro *†[1]	60	12	35.2	1.20	T.
Kingston †	......	......	......	0.60	
Liberty †	67	15	41.3	1.27	
Loudon †	......	......	......	0.92	
Lynnville †	......	......	......	1.50	
McKenzie †	68	18	42.5	1.20	
McMinnville †	65	15	42.0	2.75	
Molino †	65	16	42.2	2.95	
Nashville	......	......	......	......	T.
Newport †	64	13	38.7	0.94	
Nunnelly *[1]	68	14	42.3	3.89	
Palmetto †	70	17	44.9	1.37	
Pope *[1]	70	15	41.9	1.65	
Riddleton †	65	13	39.8	1.32	
Rockwood †	......	......	......	0.49	
Rogersville †	64	13	37.2	0.90	
Rugby	64	6	36.6	0.22	
St. Joseph †	72	14	42.9	2.68	
Sewanee †	65	12	41.0	3.22	
Strawberry Plains †	......	......	......	1.42	T.
Tellico Plains †	70	12	41.3	0.81	
Trenton	68	17	41.8	1.11	
Tullahoma †	65	14	38.8	2.35	
Union City †	68	17	41.8	1.24	T.
Waynesboro *[1]	73	16	42.5	2.67	
Texas.					
Albany *[1]	65	10	42.2	3.18	
Arthur City †	......	......	......	0.76	
Austin *b* *[5]	77	23	51.5	......	
Ballinger †	74	15	47.0	2.22	
Beeville †	84	24	55.4	1.43	
Blanco †	80	30	53.0	2.00	
Boerne *†[1]	77	26	52.0	2.41	
Bowie *[1]	71	28	49.4	2.00	
Brady	81	16	49.2	2.04	
Brazoria †	79	29	56.7	3.46	
Brenham †	79	27	53.8	1.94	
Brighton †	......	......	......	0.86	
Brownwood *[5]	70	20	47.9	2.40	T.
Burnet *†[1]	76	26	51.2	1.07	
Camp Eagle Pass †	92	26	55.1	0.57	
Childress[1]	72[e]	18	45.5	1.54	
Coleman *[3]	......	16	48.2	2.43	
College Station	76	27	53.8	1.87	
Colmesneil	......	......	......	1.93	
Columbia †	77	28	53.6	4.06	
Corpus Christi	......	......	......	......	T.
Corsicana *b* †	74	16	47.9	1.44	
Cuero †	77	25	54.3	1.57	
Dallas †	76	20	47.4	1.86	
Danevang †	76	30	52.8	3.02	
Dublin †	74	18	47.2	3.25	
Duval *[1]	82	30	56.9	2.05	
Estelle †	80	12	48.5	1.85	
Forestburg †	80	23	49.8	1.47	
Fort Clark	80	24	54.4	1.50	T.
Fort McIntosh	79	27	53.2	1.52	
Fort Ringgold †	85	27	55.1	0.57	
Fort Stockton	......	......	......	0.24	
Fort Worth †	75[e]	19[e]	50.6[e]	2.50	
Fredericksburg *†[1]	76[e]	22	49.4[e]	1.92	
Gainesville †	76	17	47.0	1.20	
Galveston	......	......	......	......	T.
Georgetown *[1]	78[d]	16	49.6	2.07	
Golindo	......	......	......	1.75	
Graham	77	9	45.4	3.12	
Grapevine †	78	19	48.5	1.76	
Hale Center †	79	21	48.8	2.00	
Texas.—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hallettsville †	78	24	54.3	1.20	
Haskell	74	20	45.2	2.60	
Hewitt	......	......	......	2.35	
Houston †	77	30	53.7	5.67	
Huntsville †	75	27	49.8	1.50	
Kent	......	......	......	0.35	
Kerrville †	77	18	47.4	1.74	
Lampasas †	80	15	50.9	1.43	
Llano *†[5]	74	25	51.6	1.20	
Longview †	75	26	50.1	2.55	
Luling †	80	24	53.6	0.85	
Mann	86[j]	19[j]	53.4[j]	1.22	
Menardville †	78	13	48.8	2.46	
Mount Blanco †[1]	77[e]	14	43.6	1.05	
New Braunfels †	79	24	53.3	1.90	
Orange †	72	28	48.4	1.56	T.
Panter †	......	......	......	2.56	
Paris †	80	20	50.7	0.52	
Point Isabel *[1]	76	36	62.0	1.50	
Rheinland †	76	20	47.8	2.89	
Roby †	......	......	......	0.98	
Rocksprings	......	......	......	1.28	
Runge †	86	23	58.5	0.54	
San Antonio	83	30	56.6	0.77	
Sanderson †	75	23	48.8	0.05	
San Marcos *a* †	......	......	......	2.41	
San Marcos *b* †	81	22	51.4	2.38	
Sierra Blanca †	67	13	47.1	......	
Stafford †	76	25	54.4	3.69	
Sulphur Springs †	80	21	51.1	1.21	
Temple *a*	76	28	51.2	2.33	
Tulia	75	15	43.0	1.93	
Tyler †	72	24	49.1	2.20	
Waco †	75	23	49.4	2.25	
Weatherford †	77	19	49.6	2.42	
Wichita Falls †	......	......	......	2.54	
Utah.					
Alpine City †	......	......	......	0.33	......
Blue Creek *[6]	55	9	30.1	0.50	5.0
Brigham City †	......	......	......	1.41	......
Cisco †	54	14	31.0	0.05	0.5
Corinne *[5]	57	10	31.3	0.90	9.0
Farmington	......	......	......	0.42	5.0
Fillmore †	66	−2	34.4	0.33	
Fort Duchesne †	46	−1	22.4	0.00	
Giles †	50	5	25.8	T.	
Grover †	58	3	30.2	0.15	2.0
Heber	46	8	28.4	0.75	6.5
Huntsville †	......	......	......	1.35	11.0
Kelton *[6]	51	13	32.6	......	......
Koosharem	49	−3	28.2	0.10	1.0
Levan †	50	9	31.9	0.36	3.0
Loa †	54	−2	25.9	T.	T.
Logan †	44	13	29.1	0.57	
Mammoth †	54	17	36.4	T.	T.
Manti †	62	4	33.3	0.30	3.0
Millville †	......	......	......	0.81	......
Moab †	45	15	30.2	0.32	3.2
Mount Pleasant *†[1]	56	12	33.0	0.20	2.0
Ogden *a* *[6]	48	20	33.4	0.95	9.5
Ogden *b* *[1]	54	10	35.6	......	......
Park City †	50	10	33.0	0.90	9.0
Parowan †	55	16	34.8	0.16	1.6
Promontory *[6]	45	12	29.1	0.32	3.2
Richfield †	56	2	31.2	0.00	
St. George †	65	10	38.8	0.20	
Salt Lake City	......	......	......	......	5.5
Scipio †	54	−1	31.2	0.40	4.0
Snowville †	49	0	32.2	0.90	1.0
Soldier Summit †	45	2	22.0	0.90	9.0
Terrace *[6]	62	3	29.8	0.00	
Thistle †*[5]	50	0	30.5	0.20	2.0
Tooele †	53	19	36.2	0.29	
Vermont.					
Bennington	54	−7	22.8	1.12	1.0
Burlington †	55	−3	23.4	0.83	6.0
Chelsea †	43	−13	17.2	0.68	4.0
Cornwall	51	−5	23.6	0.80	2.0
Enosburg Falls	49	−15	19.6	0.45	4.0
Hartland †	45	−8	20.0	0.87	3.0
Jacksonville	45	−11	19.9	1.40	5.5
Northfield	......	......	......	......	6.0
Norwich	47	−10	19.4	0.77	4.0
St. Johnsbury	42	−15	16.2	0.95	10.0
Strafford *†[1]	46	−6	18.6	0.61	5.0
Vernon *[6]	47	−14	23.0	0.91	2.8
Wells	50	−10	21.4	1.20	2.0
Woodstock	49	−12	19.6	0.72	2.5
Virginia.					
Alexandria	61	13	34.9	0.31	1.6
Ashland †	74	10	39.7	0.51	0.2
Barboursville	63	11	35.6	0.06	T.
Bigstone Gap †	66	6	33.8	1.00	
Birdsnest *†[1]	66	20	39.4	2.10	5.0
Blacksburg	63	10	35.0	0.50	
Buckingham †	66	6	34.8	T.	T.

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Burkes Garden	57	4	30.6	1.19	
Callaville†	62	6	38.4	2.84	9.0
Cape Henry	......	......	......	......	9.8
Charlottsville	66	15	38.7	T.	T.
Christiansburg†	......	......	......	0.60	
Clifton Forge	58	12	31.0	T.	
Dale Enterprise†	63	2	34.2	T.	T.
Doswell	67	6	37.5	0.85	1.0
Fredericksburg†	65	10	36.0	0.08	T.
Gordonsville	60	15	36.5	......	0.5
Grahams Forge[b]	63	13	36.4	0.89	T.
Guinea	64	10	36.8	0.01	0.1
Hampton	64	20	41.2	4.04	8.0
Hot Springs	58	4	33.6	0.19	T.
Lexington†	66	8	36.6	0.15	T.
Lynchburg	......	......	......	......	T.
Maidens	66	5	36.9		
Manassas†	64	11	38.2	0.10	1.0
Marion†	63[c]	8[c]	35.0[c]	2.10	T.
Norfolk	......	......	......	......	11.0
Nottoway†	66	7	39.5	1.56	2.5
Petersburg†	79	9	39.1	1.93	5.1
Quantico	59	10	33.2	......	......
Richmond (near)†	70	9	40.0	1.27	2.5
Rockymount†	65	14	40.6	0.43	T.
Salem†	70	16	42.2	0.41	
Saltville	65	7	35.9	1.46	T.
Smithville†	60	12	37.4	1.30	3.0
Speers Ferry†	......	......	......	1.52	
Spottsville†	63	3	36.4	2.98	12.0
Stanardsville†	65	10	36.9	T.	
Stanleyton	64	11	36.8	T.	T.
Staunton†	67	8	38.2	T.	T.
Stephens City†	63	13	35.2	0.67	1.0
Sunbeam†	58	16	36.4	3.59	10.0
Warsaw†	62	14	36.3	1.02	
Westbrook Farm	63	14	38.0	......	T.
Williamsburg	68	10	36.2	T.	T.
Woodstock†	71	7	35.8	0.35	T.
Washington.					
Ashford†	......	......	......	9.88	T.
Blaine†	56	14	39.7	8.36	T.
Cascade Tunnel†	48	13	31.6	......	64.0
Centerville†	64	7	36.6	2.77	T.
Chehalis†	59	32	44.9	10.63	
Clearwater	53	30	44.5	25.26	
Colfax†	52	10	39.0	3.64	5.3
Coupeville†	55	26	43.4	2.88	T.
Dayton	60	8	39.7	2.57	4.0
Eastsound†	57[d]	31[d]	45.0[d]	4.73	
Ellensburg†	46	11	30.4	1.36	
Ellensburg (near)	46	14	31.0	0.50	6.5
Elma	62	30	44.7	6.45	
Fort Simcoe†	60	15	36.7	2.30	4.2
Fort Spokane	50	15	33.4	3.18	12.0
Grandmound†	56	32	43.1	12.20	T.
Hunters†	47	11	30.5	2.92	6.8
Kennewick†	65	7	36.7	1.50	4.0
La Center	58	28	42.8	9.31	
Lakeside†	50	20	34.7	1.78	7.5
Lapush†	54	26	44.8	19.15	T.
Loomis†	60	5	32.7	2.52	
Madrone*†[1]	59	29	44.0	8.84	
Mayfield†	56	30	42.1	10.68	
Moxee Valley†	54	8	34.4	1.14	T.
New Whatcom†	58	24	43.8	6.54	
North Bend*[1]	60	26	42.1	19.09	
Olympia†	59	32	44.5	14.14	
Pine Hill†	53	12	37.3	4.59	4.5
Pomeroy†	60	10	41.6	2.39	10.5
Pullman†	52	14	38.0	4.40	6.0
Rosalia†	51	17	37.6	4.15	2.0
Seattle	......	......	......	......	T.
Sedro†	65	28	45.3	9.00	
Shoalwater Bay*[10]	61	33	50.0		
Silvercreek*[1]	54	29	41.1	11.83	
Snohomish†	58	29	43.4	6.81	2.0
Southbend	58	30	43.4	18.98	
Spokane	......	......	......	......	3.4
Stillaguamish	59	27	42.2	7.73	
Sunnyside†	56	10	36.1	1.93	3.0
Tacoma†	58	27	42.2	11.11	
Union City†	54	29	42.4	19.57	
Vashon†	59	29	43.4	10.78	
Walla Walla	......	......	......	......	8.8
Waterville†	48	8	28.0	2.82	9.0
Wenatchee Lake†	45	10	30.5	1.75	15.0
West Ferndale†	57	28	43.2	8.60	T.
West Virginia.					
Beverly†	66	0	34.4	2.88	6.0
Bloomery†	56	7	31.2	1.31	3.5
Bluefield†	65	9	36.2	1.40	0.5
Buckhannon *a*†	......	......	......	2.58	0.2
Burlington†	65	4	33.3	1.29	6.0
Charleston†	......	......	......	1.62	
Dayton†	......	......	......	1.97	T.
West Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Elkhorn†	64	11	38.2	1.28	0.2
Fairmont†	......	......	......	2.29	0.5
Glenville†	64	7	35.2	2.24	1.0
Grafton†	64	5	34.0	2.00	3.5
Green Sulphur	60	10	33.9	1.91	2.0
Harpers Ferry†	......	......	......	1.04	4.0
Hewett†	64	10	35.1	1.85	......
Hinton *a*†	......	......	......	1.55	T.
Hinton *b*†	62	10	35.7	......	T.
Marlinton†	58	−2	31.4	1.08	2.0
Martinsburg†	64	8	33.4	0.75	2.0
Monarch*[1]	64	16	38.2	......	1.0
Morgantown *a*†	......	......	......	1.91	......
Morgantown *b*†	62	5	35.0	1.36	4.8
New Martinsville†	63	7	36.6	2.20	2.0
Nuttallburg†	64	3[f]	38.9[e]	0.80	......
Oldfields†	67	5	33.8	0.60	1.2
Parkersburg	......	......	......	......	0.6
Pennsboro	63	6	35.2	1.85	1.0
Philippi†	65	10	34.8	2.39	1.0
Point Pleasant†	63	11	37.0	1.15	T.
Powellton†	63	12	36.2	1.99	T.
Romney	62	11	33.8	0.57	2.5
Rowlesburg†	......	......	......	1.81	8.0
Spencer	60	6	36.8	1.95	1.0
Tannery*[1]	58	10	33.2	......	4.0
Weston *a*†	......	......	......	2.50	1.0
Weston *b**[1]	60	10	35.8	......	1.0
Wheeling *a*†	......	......	......	1.61	5.1
Wheeling *b*†	60	12	37.2	1.77	3.5
White Sulphur Springs†	60	1	33.8	......	T.
Wisconsin.					
Amherst	50	−8	22.6	0.80	7.5
Apollonia*†[1]	45	−15	21.3	0.90	9.0
Bayfield	48	−6	23.8	1.20	12.0
Boscobel†	55	1	28.8	0.80	3.0
Centralia	52	0	25.3	0.80	8.0
Chilton	56	−4	25.2	......	......
Citypoint	47	......	......	0.54	6.0
Crandon†	48	−16	20.4	1.60	16.0
Delavan†	62	1	28.3	0.60	2.8
Dodgeville†	50	−1	25.8	1.11	7.5
Easton†	52	−6	23.6	0.43	5.2
Eau Claire	52	−6	24.4	0.50	5.0
Florence†	51	−12	21.1	1.37	18.0
Grand River Lock	......	......	......	0.68	7.5
Grantsburg†	43	−22	20.0	1.35	13.5
Gratiot†	55	−5	28.4	0.55	5.5
Greenbay	......	......	......	......	7.7
Hartford	......	......	......	0.73	4.5
Hartland	53	−2	27.2	0.60	5.0
Harvey	50	2	27.6	0.98	7.2
Hayward†	45[d]	−22[d]	16.6[d]	2.44	16.5
Hillsboro	53	0	25.6	0.45	4.5
Koepenick*†[1]	46	−14	22.2	0.80	8.0
La Crosse	......	......	......	......	4.8
Lancaster†	49	3	27.1	1.27	8.0
Lincoln†[2]	......	......	27.8	0.40	1.0
Madison†	50	2	27.1	0.68	4.8
Manitowoc†	52	−2	27.8	0.66	4.4
Meadow Valley†	50	−4	23.4	0.39	3.5
Medford†	45	−16	21.0	0.59	5.9
Menasha	......	......	......	0.78	5.8
Milwaukee	......	......	......	......	5.9
Neillsville†	48	−7	22.9	0.40	4.0
New Holstein	54	0	23.2	0.44	2.0
New London	53	−6	24.8	0.93	8.0
Oconto	49	−5	25.8	1.00	10.0
Osceola†	47	−15	20.3	0.79	10.3
Oshkosh†	49	−5	26.0	1.14	7.0
Pepin	48	−10	23.0	0.82	10.0
Pine River†	57	−7	24.5	0.81	7.6
Portage†	50	−3	25.2	0.47	6.0
Port Washington	57	0	30.0	1.44	6.0
Prairie du Chien	59	3	31.1	0.81	3.0
Racine	56	4	30.8	0.64	7.0
Sharon†	56	0	27.4	0.50	1.0
Shawano	51	−5	25.8	0.76	8.0
Spooner†	40	−20	17.4	0.70	7.0
Stevens Point†	49	−7	23.0	0.67	7.0
Sturgeon Bay Canal*[9]	42	−5	26.6	......	......
Valley Junction†	52	−5	24.0	0.58	5.8
Viroqua	48	0	26.1	0.45	4.5
Watertown†	50	0	27.0	1.14	6.5
Waukesha†	50	4	28.5	0.56	4.8
Waupaca†	50	−7	23.2	1.05	8.5
Wausau†	45	−8	21.8	1.36	11.5
Westbend	52	4	29.2	0.43	3.6
Westfield†	50	−5	25.2	0.45	4.5
Whitehall	47	−6	25.0	0.41	4.0
White Mound†	55	−4	26.2	0.60	6.0
Wyoming.					
Big Horn Ranch	60	8	33.4	0.00	
Cheyenne	......	......	......	......	0.3
Fort Laramie†	66	0	35.0	0.00	
Fort Washakie†	56	−13	28.0	0.00	
Wyoming—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fort Yellowstone†	43	10	27.6	0.46	4.8
Lander	......	......	......	......	T.
Laramie	56	2	31.4	T.	
Lusk†	57	8	33.4	T.	T.
Sheridan	62	5	31.4	0.15	1.5
Sundance	49	8	31.0	0.40	4.0
Mexico.					
Ciudad P. Diaz	81	26	54.6	1.10	
Leon de Aldamas	75	28	54.4	0.00	
Mexico	72	35	52.3	0.62	
Puebla	75	35	56.1	0.53	
Topolobampo*[1]	81	61	70.5	0.00	
New Brunswick.					
St. John	46	−3	21.4	2.72	3.0
West Indies.					
Grand Turk Island	......	......	......	2.03	

Late reports for November, 1896.

Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.	°	°	°	*Ins.*	*Ins.*
Juneau	51	14	29.4	0.58	6.0
Killisnoo	44	13	26.2	1.30	2.5
Arizona.					
Lochiel*[11]	75	28	50.8	0.76	
Natural Bridge	......	......	......	2.70	
Pantano*[3]	75	35	51.9	0.30	
Arkansas.					
Amity	78	23	52.0	2.92	
Brinkley	79	22	50.6	6.60	
Dardanelle	......	......	......	3.80	
Forrest	80	20	54.4	8.66	
Hot Springs *a*	70	22	45.8	6.65	
California.					
Davisville *b*	82	30	57.2	4.16	
Delta*[5]	63	27	44.7	12.00	
Fort Tejon	......	......	......	1.74	
Jackson	62	24	44.0	8.78	
Kernville	......	......	......	0.41	
Milton (near)*[1]	72	32	56.0	5.01	
Morena Dam*[1]	70	30	49.0	1.83	
Mount Breckenridge	......	......	......	2.20	3.3
Otay Dam*[1]	80	38	57.4	1.11	
San Miguel Island	74	38	56.2	2.52	
Tecarte Dam*[4]	86	28	46.6	2.27	
Tejon Ranch	......	......	......	2.12	
Colorado.					
Hugo*[5]	72	−10	29.6	......	
Florida.					
Manatee	......	......	......	0.84	
Milton*[1]	82	34	62.6	13.17	
Illinois.					
Aurora *a*	70	2	36.8	3.83	12.0
Evanston*[10]	70	4	39.2	......	......
Kankakee *b**[3][e]	70	8	38.8	......	......
Indian Territory.					
Purcell	......	......	......	5.50	
Kansas.					
Grainfield*[6]	92	−4	36.4	T.	T.
Hays City	81	8[e]	37.6	0.35	T.
Horton	72	1	36.6	0.62	T.
Pleasant Dale	......	1	......	0.28	T.
Scott City[4]	77	−9	32.7	T.	T.
Sharon Springs*[1]	92	−3	35.7	T.	T.
Winona*[1]	86	−4	35.1	T.	T.
Kentucky.					
Carlisle	......	......	......	4.24	
Louisiana.					
Calhoun	85	27	56.2	5.61	
Melville	......	......	......	4.30	
Maine.					
Orono	68	−4	34.6	4.23	5.5
Maryland.					
Annapolis	71	35	54.0	2.41	1.5
Pocomoke City	81	31	56.2	2.51	T.
Massachusetts.					
Boston *a*	......	......	......	3.73	......
Lynn *a*	69	19	43.9	3.87	......
Michigan.					
Holland*[10]	65	18	40.6	......	......
Lathrop	52	−5	25.0	6.70	26.7
Middle Island*[10]	56	16	36.7	......	......
N. Manitou Island*[10]	58	9	34.2	......	......
Sturgeon Point*[10]	68	13	38.1	......	......
Thunder Bay Island*[10]	57	14	36.4	......	......
Two Heart River*[10]	52	7	30.7	......	......
Minnesota.					
Bermidji	42	−37	14.2	3.85	16.2
Grand Portage	42	−18	17.7	6.43	T.
Leech Lake[1]	36[e]	−37	12.5	2.98	15.9
Lutsen	43	−16	22.4	4.68	......
Mount Iron	42	−36	14.1	2.20	22.0
Redwing	......	......	......	3.10	5.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature (Fahrenheit). Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Mississippi.					
Booneville[b]	76	23	58.6	2.47	
Enterprise	87	20	56.0	2.52	
Holly Springs	74	21	47.9	6.27	
Pontotoc	84	14	55.2	3.59	
Missouri.					
Hastain	76	8	43.6	2.44	
Warrensburg *[1]	77	8	43.7	1.93	
Montana.					
Agricultural College	59	—21	23.0	2.28	......
Radersburg	65	—32	22.1	0.85	8.4
Nebraska.					
Indianola *[1]	79	—10	28.2	0.15	T.
Nevada.					
Clover Valley	......	......	......	3.43	5.0
Empire Ranch	62	—15	33.0	0.10	1.0
Keysers Springs	......	......	......	0.17	
New Mexico.					
Buckmans	56	—16	27.6	1.04	7.5
Clayton	83	2	45.2	0.90	
Estalina Springs	......	......	......	0.01	0.1
Fort Bayard	81	14	47.4	T.	T.
Fort Wingate	73	0	40.3	0.30	3.0
Winsors Ranch	......	......	......	0.34	
Ohio.					
Hedges	72	8	42.3	1.04	
McConnelsville	75	18	49.2	......	
Willoughby	......	......	......	2.16	0.5
Oregon.					
Brownsville *[8]	64	10	41.6	......	
Happy Valley	65	—31	30.0	2.08	10.0
Sparta	......	......	......	5.09	44.0
Tillamook Rock L. H	......	......	......	7.71	
Texas.					
Albany *[1]	71	25	48.2	0.33	
Brownwood *[1]	81	18	58.6[c]	0.10	
Hewitt	......	......	......	1.50	
Mann	......	......	......	1.90	
San Antonio	87	32	63.4	1.05	
Tulia	84	6	44.8	0.55	
Utah.					
Kelton *[8]	70	3	39.1	0.90	4.0
Vermont.					
Brattleboro	70	12	41.9	2.11	2.0
Washington.					
Dayton	65	— 9	34.0	4.41	5.1
Ellensburg (near)	62	—24	27.0	3.50	17.0
Shoalwater Bay *[10]	61	21	43.0	......	....

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

† Weather Bureau instruments.

‡ Record furnished by the Arrowhead Reservoir Company, in the San Bernardino Mountains, San Bernardino County, Cal., at elevations varying from 4,900 to 6,900 feet.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. ÷ 3.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

Kansas, Sharon Springs, October, 1896, make precipitation read 1.10 instead of 1.00.

Virginia, Guinea, November, 1896, make precipitation read 3.87 instead of 3.97.

Oregon, Bay City, November, 1896, make precipitation read 17.59 instead of 18.59.

NOTE.—The following changes have been made in the names of stations: Nevada, Knickerbocker Mills, changed to Midas. Washington, Queets, changed to Clearwater.

TABLE III.—*Data from Canadian stations for the month of December,* 1896.

Stations.	Pressure. Mean not reduced.	Pressure. Mean reduced.	Pressure. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Precipitation. Total.	Precipitation. Departure from normal.	Prevailing direction of wind.	Total depth of snow.
	Inches.	*Inches.*	*Inches.*	°	°	*Inches*	*Inches.*		
St. Johns, N. F	29.67	29.82	— .02	25.0	— 5.4	7.67	....	n.	56.0
Sydney, C. B. I	29.90	29.96	+ .08	26.2	— 2.8	2.67	— 2.05	nw.	11.0
Grindstone, G. St. L.	....	....	....	....	....	....	....	....	....
Halifax, N. S	29.94	30.08	+ .13	25.8	— 2.7	3.25	— 2.04	w.	6.3
Grand Manan, N. B.	30.00	30.05	+ .06	25.2	....	2.54	— 2.13	w.	4.5
Yarmouth, N. S.	29.98	30.06	+ .08	28.8	— 2.7	3.49	— 1.78	nw.	10.3
St. Andrews, N. B.	....	....	....	21.0	— 3.0	1.48	— 2.13	nw.	2.0
Charlottet'n, P. E. I.	29.94	29.98	+ .06	23.0	— 0.2	2.19	— 1.81	nw.	5.5
Chatham, N. B	29.99	30.01	+ .07	12.0	— 4.5	1.42	— 1.55	w.	12.1
Father Point, Que.	30.01	30.04	+ .09	14.2	— 1.8	1.01	— 1.21	w.	10.1
Quebec, Que	29.76	30.12	+ .11	12.8	— 3.2	1.23	— 3.08	w.	10.4
Montreal, Que	29.94	30.16	+ .13	16.8	— 2.7	1.12	— 2.44	sw.	10.8
Rockliffe, Ont	29.60	30.15	+ .12	13.8	— 0.7	0.75	— 1.99	se.	7.1
Kingston, Ont	29.84	30.18	+ .13	22.8	— 2.2	1.07	— 2.57	ne.	....
Toronto, Ont	29.77	30.17	+ .11	27.0	— 1.0	0.94	— 1.60	sw.	6.0
White River, Ont	28.71	30.17	+ .12	6.0	— 2.8	0.49	— 0.95	sw.	2.9
Port Stanley, Ont	29.51	30.18	+ .11	27.9	....	1.20	— 1.41	sw.	7.2
Saugeen, Ont	29.40	30.15	+ .13	27.1	+ 0.1	2.56	— 1.57	sw.	23.6
Parry Sound, Ont	29.40	30.14	+ .11	21.3	+ 0.3	3.03	— 0.90	e.	22.9
Port Arthur, Ont	29.35	30.09	+ .07	15.4	+ 4.9	0.16	— 0.69	w.	1.6
Winnipeg, Man	29.16	30.05	— .05	11.2	+ 8.2	0.27	— 0.92	s.	1.9
Minnedosa, Man	28.12	30.04	— .06	12.7	+10.2	0.94	+ 0.21	w.	8.0
Qu'Appelle, Assin.	27.68	30.03	— .09	13.0	+ 9.0	0.45	— 0.19	s.	4.5
Medicine Hat, Assin	27.57	29.96	— .14	26.8	+11.8	0.29	— 0.07	s.	2.9
Swift Curr't, Assin.	27.30	29.99	— .13	23.2	+12.2	0.28	— 0.43	w.	2.8
Calgary, Alberta	26.25	29.91	— .21	26.4	+11.9	0.36	— 0.42	w.	3.6
Prince Albert, Sask.	28.27	29.90	....	8.8	....	0.82	....	sw.	7.2
Edmonton, Alberta.	27.50	29.95	— .04	19.4	+ 5.7	0.20	— 0.20	sw.	1.4
Battleford, Sask	28.15	30.01	....	7.1	....	0.53	....	se.	5.1
Kamloops, B. C.	28.72	30.00	....	34.4	....	0.91	....	e.	3.8
Hamilton, Bermuda	29.94	30.10	— .02	64.5	....	6.40	....	s.	0.0
Banff, Alberta	25.21	30.00	....	24.7	....	1.14	....	sw.	6.9
Esquimalt, B. C.	29.89	29.92	....	42.6	....	10.41	....	n.	0.0
Ottawa, Ont	29.82	30.21	....	16.0	....	1.25	....	sw.	12.5

TABLE IV.—*Meteorological observations at Honolulu, Republic of Hawaii, by Curtis J. Lyons, Meteorologist to the Government Survey.*

Pressure is corrected for temperature and reduced to sea level, but the gravity correction, —0.06, is still to be applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 10. Two directions of wind, connected by a dash, indicate change from one to the other; also same for force.

The rainfall for twenty-four hours is given as measured at 6 a. m. on the respective dates.

December, 1896.	Pressure at sea level. 9 a. m.	3 p. m.	9 p. m.	Temperature. 6 a. m.	2 p. m.	9 p. m.	Maximum.	Minimum.	Relative humidity. 6 a. m.	2 p. m.	9 p. m.	Wind. Direction.	Force.	Cloudiness.	Rain measured at 6 a. m.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	°	%	%	%				*Ins.*
1	30.05	29.96	30.03	67	78	68	79	67	82	70	73	w-sw.	0-3	4-10	T.
2	30.06	29.99	30.08	66	76	69	78	66	74	58	72	n-ne.	3	2	0.00
3	30.12	30.05	30.13	66	78	70	80	64	80	62	79	n-ne.	1-3	1	0.00
4	30.16	30.08	30.15	68	76	69	80	67	88	74	76	sw-ne.	0-2	4-10	0.00
5	30.11	30.01	30.10	71	77	73	78	68	66	59	71	ne.	5-3	1	0.23
6	30.08	30.00	30.07	72	81	71	82	69	77	63	93	ne.	1	2	0.00
7	30.08	30.00	30.10	70	80	72	82	69	88	64	84	sw-ne.	1	2	0.12
8	30.10	30.01	30.11	70	81	72	82	69	85	57	90	n-ne.	1-3	2	0.00
9	30.12	30.01	30.09	72	79	71	82	70	71	59	76	ne.	3	3	0.04
10	30.13	30.07	30.15	74	80	74	81	71	70	55	65	ne.	3	3	0.00
11	30.17	30.10	30.17	72	80	73	80	71	73	64	81	ne.	4	5	T.
12	30.22	30.14	30.25	71	80	72	81	70	70	63	69	ne.	4	5	0.03
13	30.25	30.10	30.23	72	77	74	79	70	69	60	65	ene.	4-6	3	0.02
14	30.17	30.11	30.19	72	79	74	79	69	72	52	64	ene.	4	3	0.02
15	30.17	30.06	30.15	71	78	74	78	70	64	56	64	ene.	4-3	3	0.00
16	30.12	30.04	30.11	72	78	71	81	71	69	57	76	ene.	3-1	4	0.00
17	30.12	30.04	30.10	66	77	71	83	67	85	68	84	ne-s.	2	1-8	0.00
18	30.10	30.03	30.11	67	78	72	82	67	79	62	71	n-nw.	0-1	5	0.00
19	30.19	30.13	30.17	68	75	69	75	67	96	53	61	sw-n.	3-6	10-3	0.09
20	30.23	30.13	30.18	67	74	70	76	67	57	52	55	ne.	5	6	0.22
21	30.18	30.11	30.18	67	75	71	78	66	67	54	62	ne.	5-4	5	0.02
22	30.16	30.11	30.16	69	74	71	77	68	67	60	64	ne.	4	7	0.01
23	30.18	30.09	30.17	68	75	69	78	66	72	51	70	ne.	4	7	0.24
24	30.20	30.09	30.17	67	74	69	75	65	58	57	72	n.	4	4	0.42
25	30.15	30.07	30.15	67	76	71	76	65	75	54	66	ne.	4	4	0.13
26	30.16	30.06	30.11	67	77	71	78	66	78	56	72	ne.	4-3	5	0.06
27	30.15	30.05	30.11	72	78	72	79	70	57	57	63	ne.	3	10-4	0.03
28	30.13	30.03	30.11	70	80	69	83	69	59	52	72	w-s.	1	4	0.00
29	30.11	30.00	30.08	68	77	71	79	68	72	61	70	w-se.	1	3	0.00
30	30.01	29.86	29.88	70	73	74	75	66	83	86	89	e-sw.	1-4	9	0.01
31	29.84	29.74	29.89	70	72	66	75	70	94	90	76	sw-se.	4-2	9	4.00
	30.13	30.04	30.12	69.3	77.2	71.1	79.1	68.0	76.3	60.8	72.4		3.0	4.1	5.69

Mean temperature: 6+2+9÷3 is 72.5; extreme temperatures, 83° and 64°.

The storm of the 30th and 31st was general over the whole group (evidently cyclonic), the wind on Hawaii being northwest when it was southeast on Oahu.

Reports not yet received from all stations, but Oahu seems to have had the heaviest rain with comparatively little wind.

The average height of lower clouds has been nearly 3,000 feet, several hundred feet higher than in the summer months.

TABLE V.—*Mean temperature for each hour of seventy-fifth meridian time, December, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak	16.6	16.5	16.5	16.0	15.7	16.0	15.8	15.7	15.1	15.5	16.8	19.0	20.4	21.4	23.2	24.6	24.5	23.2	22.0	21.0	19.9	19.7	19.2	18.7	18.9
Boston, Mass.	28.6	28.3	28.1	27.5	27.1	26.9	26.7	26.8	27.5	29.4	31.2	33.5	34.5	35.2	34.8	34.3	33.5	32.4	31.6	31.1	30.5	29.9	29.5	29.2	30.3
Buffalo N. Y.	29.1	28.7	28.5	28.3	28.2	28.2	28.2	28.4	28.9	29.7	30.8	31.6	32.4	32.7	32.6	32.2	31.6	30.8	30.4	30.7	30.2	29.8	29.8	29.6	30.1
Chicago, Ill.	31.5	31.3	31.0	31.0	30.8	30.7	30.5	30.5	30.6	31.1	32.3	33 9	34.8	35.8	36.2	36.5	36.2	35.6	34.9	34.7	33.8	33.3	33.1	32.8	33.0
Cincinnati, Ohio	36.1	35.7	35.4	34.8	34.3	34.0	33.6	33.7	33.9	35.3	37.3	39.2	40.5	41.7	42.5	42.9	42.5	42.0	41.1	40.5	39.6	39.0	38.3	37.5	38.0
Cleveland, Ohio	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Detroit, Mich.	28.6	28.0	28.2	28.2	28.1	27.9	57.6	27.5	27.6	28.7	29.8	31.1	32.4	33.1	33.9	33.8	33.1	32.4	31.5	31.3	30.9	30.4	30.1	29.8	30.2
Dodge City, Kans.	34.5	34.0	33.0	32.4	31.6	31.4	31.3	31.1	30.8	32.3	37.6	42.8	46.8	49.6	52.0	53.5	53.8	51.7	46.0	42.1	39.3	38.1	37.2	36.6	39.6
Eastport, Me.	21.7	21.5	21.6	21.6	21.5	21.7	21.8	21.9	22.4	23.3	24.1	24.8	25.5	26.1	26.3	25.9	25.0	24.4	24.0	23.8	23.1	22.5	21.8	21.5	23.2
Galveston, Tex.	55.4	55.3	55.0	54.5	54.3	54.1	53.5	53.4	53.4	54.2	55.3	56.8	58.3	59.3	59.9	69.9	59.7	59.3	58.3	57.8	57.3	57.0	56.8	56.4	56.5
Havre, Mont.	27.8	28.4	28.1	28.0	28.2	29.0	30.0	29.9	30.3	29.5	29.5	30.4	32.5	33.2	34.4	35.3	35.4	34.6	31.9	31.4	30.1	29.6	29.3	28.5	30.6
Kansas City, Mo.	37.4	36.7	36.5	35.9	35.1	34.6	34.4	34.1	33.8	34.8	37.3	40.2	42.5	44.5	46.2	47.1	46.9	45.7	44.5	43.5	42.2	41.3	40.3	39.4	39.8
Key West, Fla.	69.5	69.3	69.1	69.1	69.1	68.9	68.7	68.9	69.3	69.6	70.2	70.5	71.4	71.4	71.6	71.4	71.0	70.4	70.0	70.0	69.8	69.6	69.6	69.5	69.9
Memphis, Tenn.	44.4	43.9	42.7	42.0	41.5	40.9	39.3	40.2	40.5	41.0	44.5	48.2	50.2	52.1	53.5	54.2	54.1	52.8	51.5	50.1	49.0	48.3	47.4	46.4	46.6
New Orleans, La.	51.3	50.7	50.2	49.6	49.3	48.8	48.5	48.5	49.3	51.2	53.7	56.6	58.6	59.8	60.9	60.9	60.2	59.0	57.3	56.5	55.0	54.2	53.4	52.7	54.0
New York, N. Y.	29.9	29.5	29.0	28.7	28.6	28.4	28.4	28.7	29.2	30.5	32.4	33.3	34.7	35.5	36.2	35.9	35.4	34.3	33.5	33.2	32.3	32.0	31.3	30.6	31.7
Philadelphia, Pa.	33.3	32.8	32.3	31.9	31.4	30.9	30.7	31.2	31.8	33.5	34.9	36.6	37.7	38.3	38.7	38.4	37.7	37.0	36.4	36.5	35.5	35.0	34.3	34.0	34.6
Pittsburg, Pa.	33.5	33.2	32.6	32.5	32.3	32.2	32.3	32.8	32.9	33.8	35.1	36.7	38.2	39.2	39.9	40.3	39.7	39.1	38.0	37.1	36.5	35.9	35.1	34.6	35.6
Portland, Oreg.	43.4	43.3	43.1	42.7	43.2	42.9	42.9	43.1	42.8	42.6	42.4	42.6	43.4	43.7	44.5	45.0	45.4	45.6	45.4	45.2	44.6	44.3	43.8	43.8	43.7
St. Louis, Mo.	37.9	37.5	37.1	36.6	36.1	35.6	35.5	35.5	35.3	36.3	38.4	40.4	42.3	44.2	45.5	46.3	46.5	45.4	44.2	43.2	42.1	41.3	40.5	39.8	40.2
St. Paul, Minn.	21.8	21.5	21.2	21.1	21.3	21.4	21.4	21.7	21.4	21.6	22.8	24.4	25.6	26.4	27.0	27.3	27.5	27.0	26.5	26.0	25.3	24.8	24.3	23.9	23.9
Salt Lake City, Utah	32.9	32.8	32.5	32.2	32.0	32.1	31.5	32.1	31.2	31.4	32.5	34.7	37.3	39.7	41.1	42.2	43.3	42.7	40.5	38.3	37.1	36.3	34.5	33.8	35.6
San Diego, Cal.	54.8	54.0	53.5	53.3	53.0	52.7	52.4	52.5	52.3	52.2	54.5	50.0	62.2	64.7	65.9	65.9	66.0	64.7	63.5	61.0	59.2	58.0	56.6	55.5	57.8
San Francisco, Cal.	52.0	51.4	50.9	50.5	50.2	50.0	49.5	49.8	49.0	49.3	49.5	50.4	51.2	53.0	53.9	55.2	55.9	56.4	55.8	54.7	53.7	53.1	52.4	52.2	52.1
Savannah, Ga.	45.5	44.5	44.0	43.5	42.7	42.3	42.0	43.0	45.3	48.5	51.7	54.5	56.2	57.6	57.8	57.4	55.8	53.7	52.0	50.9	49.8	49.0	47.8	46.8	49.3
Washington, D. C.	32.6	32.4	32.2	31.9	31.5	31.1	30.8	31.3	32.4	34.8	37.1	39.0	40.7	42.0	42.5	42.4	41.2	39.4	37.7	36.4	35.3	34.6	33.9	33.3	35.7

TABLE VI.—*Mean pressure for each hour of seventy-fifth meridian time, December, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak	28.260	.258	.256	.258	.254	.247	.240	.238	.235	.234	.238	.246	.235	.219	.206	.198	.202	.214	.219	.224	.226	.228	.229	.231	.233
Boston, Mass.	29.975	.981	.978	.968	.971	.980	.991	.997	.005	.010	.995	.976	.969	.972	.982	.985	.986	.996	.004	.003	.001	.003	.002	.992	.988
Buffalo, N. Y.	29.300	.301	.309	.307	.306	.314	.323	.330	.340	.345	.341	.325	.306	.297	.290	.293	.295	.297	.305	.307	.306	.304	.304	.305	.310
Chicago, Ill.	29.271	.267	.275	.271	.264	.262	.267	.275	.281	.291	.297	.282	.264	.246	.242	.246	.252	.259	.263	.266	.264	.262	.263	.264	.266
Cincinnati, Ohio	29.550	.551	.552	.551	.550	.554	.561	.564	.571	.578	.580	.564	.540	.524	.514	.512	.515	.522	.529	.534	.538	.539	.540	.540	.545
Cleveland, Ohio	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Detroit, Mich.	29.368	.367	.373	.369	.369	.369	.376	.383	.387	.393	.392	.376	.357	.343	.337	.342	.348	.356	.362	.367	.369	.368	.367	.368	.367
Dodge City, Kans.	27.528	.525	.520	.523	.525	.520	.522	.525	.532	.532	.533	.534	.515	.491	.469	.455	.455	.459	.470	.483	.491	.495	.498	.500	.504
Eastport, Me.	29.965	.967	.960	.952	.949	.953	.965	.979	.993	.995	.981	.970	.961	.959	.959	.966	.973	.979	.989	.992	.991	.990	.987	.983	.973
Galveston, Tex.	30.216	.207	.201	.195	.194	.195	.197	.207	.211	.228	.236	.232	.214	.182	.167	.157	.157	.163	.169	.183	.194	.202	.205	.204	.197
Havre, Mont.	27.301	.299	.295	.291	.296	.291	.287	.286	.292	.290	.309	.321	.324	.310	.302	.294	.292	.293	.296	.296	.301	.297	.295	.295	.298
Kansas City, Mo.	29.171	.166	.165	.167	.165	.163	.166	.170	.176	.185	.191	.193	.173	.152	.132	.124	.123	.122	.125	.131	.137	.139	.140	.146	.155
Key West, Fla.	30.109	.100	.088	.085	.085	.086	.096	.114	.132	.142	.142	.126	.101	.085	.076	.075	.080	.089	.101	.113	.123	.127	.126	.120	.105
Memphis, Tenn.	29.815	.811	.812	.814	.813	.813	.815	.825	.834	.845	.854	.846	.820	.795	.778	.771	.766	.772	.777	.785	.789	.792	.795	.797	.806
New Orleans, La.	30.174	.171	.167	.165	.164	.167	.178	.186	.201	.213	.216	.203	.177	.150	.136	.130	.131	.137	.148	.158	.166	.173	.175	.174	.169
New York, N. Y.	29.807	.808	.807	.802	.801	.807	.821	.832	.843	.849	.841	.830	.820	.816	.815	.816	.822	.827	.829	.830	.830	.829	.828	.823	.822
Philadelphia, Pa.	30.051	.057	.059	.053	.055	.061	.075	.082	.099	.103	.094	.082	.061	.056	.054	.056	.059	.059	.067	.065	.064	.065	.064	.061	.067
Pittsburg, Pa.	29.270	.275	.281	.282	.283	.287	.296	.299	.303	.308	.310	.298	.279	.268	.259	.257	.257	.261	.265	.270	.271	.269	.271	.270	.279
Portland, Oreg.	29.855	.857	.856	.855	.853	.855	.848	.846	.846	.851	.856	.867	.882	.685	.874	.863	.852	.851	.848	.850	.850	.852	.855	.857	.857
St. Louis, Mo.	29.611	.604	.606	.609	.604	.603	.608	.615	.630	.625	.630	.624	.603	.585	.571	.566	.569	.570	.575	.581	.589	.591	.592	.593	.598
St. Paul, Minn.	29.207	.203	.199	.203	.198	.194	.193	.191	.194	.198	.208	.214	.198	.184	.175	.174	.178	.184	.182	.183	.183	.180	.178	.178	.191
Salt Lake City, Utah	25.809	.809	.805	.804	.805	.800	.798	.793	.796	.799	.807	.813	.815	.801	.783	.773	.770	.773	.777	.779	.785	.786	.793	.795	.794
San Diego, Cal.	30.078	.075	.073	.070	.069	.066	.062	.059	.064	.075	.086	.096	.100	.096	.070	.052	.040	.038	.037	.040	.045	.052	.060	.066	.065
San Francisco Cal.	30.012	.016	.013	.003	.004	.999	.989	.984	.994	.005	.017	.031	.042	.035	.015	.997	.991	.989	.984	.980	.986	.994	.997	.006	.008
Savannah, Ga.	30.113	.115	.116	.115	.116	.121	.132	.141	.151	.159	.155	.137	.113	.092	.081	.078	.083	.087	.097	.109	.114	.115	.118	.120	.116
Washington, D. C.	30.095	.098	.100	.097	.096	.104	.113	.127	.139	.150	.145	.126	.105	.094	.086	.087	.087	.090	.096	.100	.101	.101	.104	.102	.106

TABLE VII.—*Average wind movement for each hour of seventy-fifth meridian time, December, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex	7.6	7.0	7.4	7.4	7.5	8.4	7.9	6.9	6.6	7.2	8.0	10.1	10.2	10.3	10.1	10.4	10.3	9.9	8.5	7.1	7.0	7.1	7.0	7.0	8.2
Albany, N. Y	7.0	7.2	7.5	7.7	8.2	7.7	7.9	7.9	8.2	9.0	9.7	10.3	10.9	9.9	9.8	8.2	7.4	7.5	7.3	6.8	7.1	7.2	7.4	7.3	8.1
Alpena, Mich	8.4	7.9	7.8	7.6	7.3	7.7	7.8	7.8	8.0	8.5	9.1	10.4	10.5	10.6	10.5	10.2	9.7	9.4	8.6	8.6	8.9	8.2	8.6	8.4	8.8
Amarillo, Tex	13.4	13.6	14.1	14.7	14.6	14.1	14.3	13.7	14.3	13.6	13.5	15.0	16.0	16.0	15.7	15.2	14.8	13.8	11.7	12.4	12.6	13.1	14.3	13.7	14.1
Atlanta, Ga	9.8	9.7	9.8	10.3	10.1	9.1	8.4	8.2	8.2	9.2	9.7	9.5	10.0	10.2	10.3	9.6	9.6	8.5	8.8	9.6	10.1	10.4	9.8	9.9	9.5
Atlantic City, N. J	12.0	12.2	12.0	12.8	13.4	13.2	13.0	13.5	13.6	14.5	14.4	14.7	14.4	14.8	14.1	13.0	12.2	11.5	11.7	12.5	11.8	11.9	11.4	11.8	12.9
Augusta, Ga	4.9	5.1	4.7	4.4	4.7	4.7	4.5	4.5	4.8	5.3	6.1	6.4	6.8	6.7	7.3	6.8	6.2	5.1	4.5	4.1	4.0	4.2	4.5	4.2	5.2
Baker City, Oreg	5.8	6.6	6.3	6.1	6.7	7.0	6.6	7.2	6.5	6.1	6.8	7.3	6.8	6.6	7.5	6.7	6.2	5.6	4.7	4.9	5.8	6.3	6.5	6.1	6.4
Baltimore, Md	3.6	3.7	3.7	3.5	3.5	3.3	4.2	4.5	4.8	5.4	6.0	6.3	6.2	6.1	6.0	5.5	4.8	4.2	4.1	3.5	3.6	3.7	3.9	3.5	4.5
Bismarck, N. Dak	6.7	6.7	6.4	6.3	6.2	5.8	6.5	5.5	5.4	5.3	5.5	5.2	6.2	6.9	7.5	7.9	7.9	7.8	7.2	6.6	6.2	6.5	6.2	6.7	6.5
Block Island, R. I	18.4	18.8	18.9	19.1	19.2	19.8	19.5	20.5	20.5	21.2	20.7	21.0	21.5	20.3	19.7	18.8	18.2	18.0	18.0	18.2	18.4	18.8	18.7	19.5	19.4
Boston, Mass	11.4	11.4	11.5	12.5	12.4	12.4	12.9	13.1	13.4	13.6	13.8	14.4	14.5	14.7	14.1	12.8	11.3	11.6	11.9	11.5	11.6	11.5	11.6	11.5	12.6
Buffalo, N. Y	17.1	17.0	16.7	16.5	16.2	15.7	14.9	15.1	15.5	15.9	17.5	17.3	18.3	18.0	17.8	16.5	17.4	18.0	18.5	18.0	17.6	17.2	16.3	15.8	16.9
Cairo, Ill	7.6	7.3	7.0	7.2	6.5	6.6	6.7	7.1	7.6	8.7	9.6	9.3	9.6	9.6	9.7	10.0	9.5	8.0	8.0	7.8	7.7	8.2	8.1	7.5	8.1
Cape Henry, Va	16.5	16.7	16.2	16.5	17.9	17.4	16.7	17.0	17.2	17.3	17.5	17.2	16.6	16.4	14.4	14.0	13.9	13.4	13.5	14.9	15.2	15.8	15.7	15.3	16.0
Charleston, S. C	8.0	8.0	7.5	7.8	7.8	7.5	8.3	8.0	7.8	8.4	8.3	7.8	8.0	8.2	8.3	7.9	7.4	6.0	6.4	6.5	6.7	7.5	7.0	6.6	7.6
Charlotte, N. C	6.9	7.3	6.7	6.8	6.9	6.8	6.3	6.3	6.3	7.1	6.9	6.9	7.2	7.5	7.5	7.4	6.9	6.3	6.1	6.4	6.2	6.6	6.8	7.1	6.8
Chattanooga, Tenn	5.9	5.2	5.8	5.5	5.4	5.2	5.1	5.3	5.4	5.8	6.5	7.5	8.0	8.2	8.5	8.6	8.9	8.2	7.9	6.8	6.7	6.6	5.6	5.3	6.6
Cheyenne, Wyo	9.9	11.1	11.4	10.3	11.0	10.3	10.9	11.1	11.3	10.8	11.8	13.7	15.5	16.9	17.3	16.3	14.8	13.3	10.6	10.5	9.8	9.3	9.8	10.1	12.0
Chicago, Ill	15.2	14.6	14.3	14.6	14.3	14.9	15.5	15.3	16.0	15.8	16.5	16.7	17.9	16.7	17.1	16.4	16.5	16.5	16.5	16.5	17.4	16.7	16.4	15.5	16.0
Cincinnati, Ohio	6.6	6.8	6.5	6.2	6.0	5.8	5.7	5.9	6.4	7.2	8.2	9.2	9.6	9.6	9.5	9.0	8.2	7.5	6.8	6.7	6.8	6.7	7.2	7.0	7.3
Cleveland, Ohio	15.5	14.7	14.3	14.5	14.3	13.6	13.4	12.9	12.5	13.1	13.6	13.7	15.0	15.2	15.6	15.1	14.8	14.5	15.4	16.2	16.2	16.0	15.9	15.8	14.7
Columbia, Mo	8.0	7.6	7.6	7.8	7.6	7.9	7.6	8.1	8.4	8.5	9.0	9.5	9.5	9.7	9.9	9.5	9.1	7.7	7.9	8.3	8.1	8.6	8.4	8.2	8.4
Columbus, Ohio	6.7	7.2	6.6	6.7	6.3	6.6	6.3	6.9	7.7	7.7	8.4	8.9	8.9	9.2	9.0	9.2	8.3	7.7	8.0	8.0	7.8	7.5	7.2	7.2	7.7
Concordia, Kans	5.3	5.3	5.1	5.3	5.2	4.5	4.9	5.1	5.9	5.8	6.4	7.2	7.4	7.4	7.4	7.1	7.1	5.2	4.9	5.7	5.5	6.3	5.5	5.3	5.9
Corpus Christi, Tex	9.2	9.7	9.9	9.8	9.6	8.7	8.2	8.2	8.4	8.9	9.9	9.6	10.6	11.7	11.3	11.6	11.7	10.6	9.0	8.2	8.2	8.5	8.7	8.9	9.5
Davenport, Iowa	6.2	6.4	6.3	6.1	5.9	5.8	6.3	6.3	6.6	6.9	7.6	8.1	8.2	8.8	8.6	8.4	7.8	6.9	6.2	6.2	6.3	6.1	6.2	6.6	6.9
Denver, Colo	7.7	7.3	7.6	8.0	8.5	8.0	7.3	7.8	8.7	7.5	6.9	6.5	5.7	5.8	7.4	9.0	8.8	8.3	7.9	7.2	6.8	7.6	8.4	7.2	7.6
Des Moines, Iowa	6.3	6.2	5.6	5.4	6.3	6.0	6.5	6.8	6.9	7.4	8.2	9.1	9.6	9.2	8.7	8.2	8.3	7.5	6.7	7.1	6.8	6.9	6.9	6.5	7.2
Detroit, Mich	9.0	9.0	8.9	8.2	8.2	8.2	7.9	8.2	8.6	9.6	10.3	10.5	10.9	10.8	11.2	10.9	10.3	9.5	9.2	9.2	9.4	9.4	9.2	9.1	9.4
Dodge City, Kans	8.4	8.0	8.4	8.7	8.6	8.9	8.8	8.8	8.8	8.9	10.2	11.3	11.3	12.0	11.8	12.4	11.4	9.5	7.5	7.1	6.9	7.7	8.5	8.6	9.3
Dubuque, Iowa	2.7	3.3	2.8	3.2	3.1	3.3	3.5	3.4	3.4	3.7	4.4	5.0	4.9	4.9	4.8	4.9	4.1	3.3	3.4	3.2	3.3	3.2	3.2	3.5	3.7
Duluth, Minn	9.2	9.9	8.9	8.3	9.4	8.8	8.3	8.0	8.1	7.9	8.2	8.6	8.5	8.1	8.1	8.5	8.8	8.3	7.8	8.9	8.8	9.6	9.3	9.6	8.6
Eastport, Me	13.3	13.2	13.4	14.0	14.8	14.8	14.0	13.6	14.7	14.1	13.7	13.5	12.8	13.0	13.0	12.8	13.1	13.7	14.7	15.3	15.5	14.7	13.9	13.7	13.9
El Paso, Tex	7.8	9.2	8.2	8.8	9.0	8.6	8.9	7.9	8.1	8.5	8.7	9.5	11.2	12.9	13.1	13.9	13.1	12.3	10.5	8.5	7.5	8.2	8.0	7.9	9.6
Erie, Pa	12.2	12.5	12.6	12.8	12.1	11.6	11.6	11.2	11.6	11.4	11.0	11.2	12.7	12.7	13.1	12.3	11.5	11.6	12.1	12.0	11.2	12.7	12.3	12.4	12.0
Eureka, Cal	5.7	5.0	4.5	4.6	4.7	4.4	4.6	5.1	5.9	5.6	5.2	4.7	4.4	5.7	6.7	7.0	7.2	7.4	6.6	5.9	5.4	5.9	6.2	5.3	5.6
Fort Canby, Wash	23.2	22.8	23.3	23.5	23.3	22.0	21.0	20.3	21.0	20.3	20.1	20.4	19.1	20.3	20.4	20.2	19.9	19.5	21.6	21.5	21.1	21.0	19.6	21.2	21.1
Fort Smith, Ark	6.0	5.7	6.5	6.0	6.1	5.9	5.6	6.0	5.5	5.4	6.4	6.9	6.8	6.5	6.9	7.3	7.4	6.2	5.9	5.8	5.7	5.5	5.6	5.9	6.1
Fresno, Cal	3.1	3.5	3.7	3.7	3.5	3.8	3.6	3.7	3.9	4.3	4.3	4.0	4.0	4.3	4.5	4.4	4.6	3.8	4.0	3.5	3.1	3.0	3.1	3.2	3.8
Galveston, Tex	11.3	11.5	10.9	10.8	10.5	10.2	10.1	10.3	10.6	10.1	10.7	10.7	11.0	11.2	11.0	10.3	10.1	9.8	9.8	9.9	10.2	10.6	10.2	10.8	10.5
Grand Haven, Mich	9.0	8.7	9.0	8.8	8.8	8.6	8.3	8.7	9.4	10.3	11.2	11.6	11.5	11.2	10.8	10.5	10.1	9.7	9.9	9.8	10.3	9.8	9.9	9.4	9.8
Greenbay, Wis	6.9	6.4	6.9	6.9	7.2	6.8	6.7	6.6	6.3	6.9	8.0	7.8	8.4	8.1	7.8	7.0	6.4	6.2	5.7	6.0	6.3	6.2	6.2	6.5	6.8
Hannibal, Mo	8.5	8.1	8.0	8.1	7.8	7.4	7.8	7.6	7.7	8.9	9.9	10.4	10.5	10.7	10.6	10.2	10.0	8.3	7.5	7.4	8.5	8.5	8.7	9.1	8.8
Harrisburg, Pa	7.1	7.1	7.3	6.6	6.1	6.8	6.5	7.2	8.1	8.5	9.5	8.8	8.8	8.1	7.8	7.6	6.9	6.4	6.1	5.6	6.0	6.0	6.5	6.7	7.2
Hatteras, N. C	16.1	16.2	16.4	16.1	16.5	16.1	16.3	16.1	15.9	16.5	16.3	15.3	14.9	14.5	14.0	14.4	15.7	15.5	15.4	15.5	14.8	15.2	15.4	15.3	15.6
Havre, Mont	7.6	8.5	9.5	9.9	9.0	9.9	10.9	11.3	12.5	11.6	10.6	10.2	11.0	11.4	10.5	10.5	10.3	9.7	9.2	9.0	8.7	7.7	7.6	7.7	9.8
Helena, Mont	5.7	5.1	5.4	4.9	5.5	5.5	5.7	5.4	4.7	4.6	4.5	4.3	6.0	6.5	7.2	6.8	7.4	7.0	6.0	6.0	6.2	7.5	6.8	6.7	5.9
Huron, S. Dak	11.4	11.6	11.4	11.6	11.3	10.6	11.1	10.5	10.3	10.9	11.1	11.5	11.0	11.4	11.7	11.5	11.2	10.8	10.9	11.2	12.3	12.5	12.6	12.6	11.4
Idaho Falls, Idaho	6.6	7.1	7.6	7.1	7.1	6.2	6.0	5.9	5.9	6.3	5.6	5.5	5.2	5.3	6.0	6.3	6.5	5.7	5.8	5.9	6.0	6.2	6.6	6.7	6.2
Indianapolis, Ind	9.4	8.8	8.5	8.6	8.7	8.5	8.5	9.5	9.4	10.0	11.2	11.5	12.0	12.1	12.1	11.9	11.2	10.0	10.3	10.1	9.8	9.6	10.3	10.3	10.1
Jacksonville, Fla	5.6	5.9	6.1	6.3	6.1	6.7	6.3	6.4	6.4	7.1	7.8	8.8	8.9	8.9	9.2	9.1	8.5	7.0	6.1	5.7	6.2	6.1	5.9	5.6	6.9
Jupiter, Fla	8.3	9.0	8.8	9.2	9.2	9.5	9.4	9.8	9.7	10.2	10.9	11.0	11.6	12.0	11.8	11.4	10.4	10.0	9.4	9.4	9.4	9.7	9.5	9.5	10.0
Kansas City, Mo	7.2	6.7	6.8	7.0	7.2	7.0	7.1	7.4	7.8	8.1	8.2	7.8	9.0	9.2	8.9	8.9	8.6	7.8	7.2	7.4	7.4	7.8	7.6	8.1	7.7
Keokuk, Iowa	6.8	6.5	6.2	6.1	6.2	6.2	6.4	6.6	6.8	6.9	8.0	8.2	8.6	8.8	9.0	8.7	7.9	6.7	6.3	6.8	7.2	7.2	7.2	7.0	7.2
Key West, Fla	11.0	11.1	11.0	11.2	11.1	11.6	11.4	11.6	13.0	12.5	12.4	12.6	13.1	13.1	12.8	12.5	12.7	12.1	11.9	12.1	12.0	12.2	12.0	11.6	12.0
Kittyhawk, N. C.*	14.7	15.4	15.5	15.3	14.7	14.5	13.9	14.4	14.4	14.7	15.9	14.8	14.6	14.9	15.4	15.3	15.0	14.5	13.5	13.0	13.0	12.2	12.3	12.3	14.3
Knoxville, Tenn	3.3	3.6	3.3	3.6	3.6	3.6	4.0	3.8	4.0	4.9	5.5	5.7	6.3	6.8	6.5	6.9	6.3	5.3	4.9	4.8	4.3	4.2	3.8	3.6	4.7
La Crosse, Wis	6.1	6.6	6.5	6.6	6.5	6.6	6.7	6.4	6.5	6.0	6.1	5.9	5.5	6.0	6.2	6.0	6.0	5.8	5.5	5.6	5.8	5.6	5.7	6.1	6.1
Lander, Wyo	3.1	2.8	2.5	2.5	2.5	2.6	2.9	2.6	2.4	2.6	2.3	2.6	2.9	3.3	3.9	4.5	4.8	4.2	3.8	3.6	3.0	3.0	3.3	2.9	3.1
Lexington, Ky	12.2	12.1	12.7	11.7	11.6	11.4	11.5	11.9	12.6	13.2	13.8	13.9	14.1	13.7	13.9	13.1	11.7	11.2	11.8	12.3	12.7	12.9	12.8	12.7	12.6
Little Rock, Ark	5.3	5.7	5.7	5.5	4.8	5.3	4.9	5.2	4.6	6.2	7.1	7.0	7.9	8.2	8.4	8.1	8.2	7.3	6.6	5.9	5.9	6.6	6.0	5.7	6.4
Los Angeles, Cal	2.3	2.8	3.1	2.9	3.0	3.7	3.9	4.2	3.8	3.6	3.9	4.1	4.6	4.6	4.4	4.3	4.8	4.9	4.8	3.7	2.7	2.1	2.3	2.5	3.6
Louisville, Ky	7.5	7.5	7.8	7.0	7.3	7.3	7.2	7.9	8.1	9.2	9.3	9.7	10.4	10.8	10.4	10.6	10.1	8.9	8.9	9.2	9.1	8.5	8.3	7.8	8.7
Lynchburg, Va	3.5	3.5	3.7	3.6	3.2	3.0	3.2	3.7	3.7	4.4	5.2	5.6	5.9	5.8	6.0	5.5	4.6	4.4	4.3	4.4	4.1	3.9	4.1	3.7	4.3
Marquette, Mich	9.7	10.1	10.2	9.9	10.1	11.5	11.1	11.4	11.1	12.2	12.1	11.4	10.3	10.8	10.0	9.4	8.6	7.5	6.9	8.5	9.1	8.5	8.6	8.8	9.9
Memphis, Tenn	9.0	9.3	9.7	10.0	10.0	9.6	9.4	9.5	9.1	9.5	9.5	9.3	9.2	8.9	8.9	8.7	8.5	8.5	8.7	9.5	9.6	10.3	10.0	9.5	9.3
Miles City, Mont	5.2	4.7	4.4	4.4	4.2	4.1	4.5	5.2	4.6	4.9	5.2	5.3	5.8	5.5	6.0	6.7	6.1	5.8	5.2	5.2	5.3	4.6	4.7	5.0	5.1
Milwaukee, Wis	8.2	7.8	8.2	8.2	7.9	7.5	7.8	7.8	8.2	8.8	9.9	10.4	11.0	10.7	10.7	10.3	9.5	8.9	8.4	8.8	8.7	8.6	8.4	8.5	8.9
Mobile, Ala	5.9	5.7	5.6	5.8	6.6	6.8	6.8	6.1	6.4	7.1	7.5	8.1	8.3	8.0	8.3	8.4	8.0	7.6	6.9	6.7	6.5	7.1	6.9	6.9	7.0
Montgomery, Ala	5.3	5.1	5.2	4.9	5.0	4.9	4.9	5.4	5.2	6.3	7.2	7.5	7.7	8.1	8.0	7.8	7.7	6.9	5.8	6.2	6.3	5.9	5.6	5.9	6.2
Moorhead, Minn	10.4	10.5	9.8	9.8	10.3	10.2	9.9	9.9	9.4	9.6	9.6	9.9	9.7	10.3	10.1	10.5	10.2	10.3	11.2	11.3	10.7	11.1	11.8	11.3	10.3
Nantucket, Mass	14.3	14.2	14.4	14.5	14.0	14.0	14.5	14.5	14.3	14.8	15.4	15.7	15.5	15.5	15.5	14.6	13.8	14.5	14.6	14.2	14.0	14.4	14.8	14.6	14.6
Nashville, Tenn	5.5	5.1	5.4	5.1	5.0	4.6	5.1	5.4	5.3	6.3	7.1	7.9	8.5	8.8	8.9	9.2	8.5	7.2	7.1	6.5	5.7	5.6	5.6	5.9	6.5
New Haven, Conn	9.8	9.6	9.9	9.5	10.5	9.9	10.6	10.3	10.5	10.9	12.1	12.6	12.7	12.3	11.5	10.5	9.5	8.2	8.4	8.5	8.5	8.7	8.7	9.1	10.1
New Orleans, La	8.7	8.7	8.5	9.1	9.4	8.9	9.6	9.2	9.3	10.3	10.7	11.1	11.3	11.6	11.6	11.4	10.8	9.4	8.6	8.4	8.9	8.5	8.4	8.4	9.6
New York, N. Y	14.7	14.6	14.9	14.8	14.3	14.5	14.7	14.2	14.7	15.4	14.9	15.5	15.2	15.2	14.2	14.3	14.5	13.9	13.8	13.9	13.8	13.3	14.1	14.1	14.5
Norfolk, Va	8.5	8.5	8.5	8.4	8.2	7.7	8.3	8.5	8.5	9.6	10.1	9.9	10.6	10.1	9.0	8.2	7.5	6.6	7.4	7.5	7.7	7.7	7.7	7.9	8.5
Northfield, Vt	7.1	7.4	7.5	7.6	7.6	8.5	8.2	8.2	8.1	9.1	9.6	9.5	9.5	9.5	10.0	9.3	8.8	9.2	9.0	8.4	8.3	7.8	7.4	7.0	8.4
North Platte, Nebr	6.7	6.8	7.0	6.8	7.2	6.7	6.4	6.6	6.4	6.6	7.0	7.6	8.7	9.5	9.8	9.5	8.9	7.7	7.0	6.8	6.6	6.2	6.7	6.9	7.3
Oklahoma, Okla	6.0	5.9	6.1	5.8	5.5	5.6	5.5	5.2	5.5	6.4	8.0	9.1	9.8	10.1	10.4	10.6	10.1	8.5	6.2	6.2	6.3	6.6	6.7	6.4	7.2
Omaha, Nebr	6.0	6.4	6.0	6.3	6.5	6.6	6.7	6.9	6.8	7.1	6.9	7.3	7.3	7.7	7.8	7.3	7.5	6.5	5.9	6.5	5.8	6.5	6.1	6.5	6.7
Oswego, N. Y	12.4	12.6	12.6	12.4	13.1	13.2	12.5	12.4	12.2	12.0	12.2	12.1	12.2	12.3	12.4	11.9	11.5	12.3	12.4	13.1	13.1	13.3	13.3	12.7	12.5
Palestine, Tex	5.8	5.8	5.3	4.9	5.6	5.7	5.6	5.7	5.6	6.6	8.0	7.8	7.8	8.0	7.8	8.0	7.7	7.1	5.0	4.6	4.6	5.0	5.7	5.9	6.3
Parkersburg, W. Va	5.9	5.9	5.5	5.8	5.1	5.0	5.1	5.1	5.2	6.3	6.6	7.2	8.0	8.1	8.0	7.1	7.0	6.2	5.5	5.6	5.1	5.3	5.2	5.3	6.0

TABLE VII.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Pensacola, Fla.	8.5	8.2	8.9	9.0	9.9	9.8	9.7	10.0	9.9	11.0	11.0	10.3	10.4	10.2	10.4	10.5	9.6	8.3	7.5	7.8	8.5	8.9	9.0	9.2	9.4
Philadelphia, Pa.	8.8	9.8	9.4	9.6	8.7	8.5	8.9	9.6	10.2	10.7	11.0	10.9	11.5	11.4	11.5	10.9	10.1	9.2	8.8	9.2	9.4	9.3	8.7	8.4	9.8
Phœnix, Ariz.	2.7	2.6	2.7	3.5	3.6	3.2	2.9	2.8	2.8	3.0	3.0	3.3	3.1	4.4	4.2	4.0	3.8	3.7	3.0	2.4	2.3	2.2	2.3	2.4	3.1
Pierre, S. Dak.	6.1	5.2	5.6	5.9	6.3	6.0	6.7	6.9	6.5	6.2	6.3	7.5	8.5	8.7	8.9	9.3	7.7	6.8	7.3	6.6	6.7	6.2	5.9	6.1	6.8
Pittsburg, Pa.	5.5	6.0	6.3	5.8	6.1	5.8	5.8	6.0	6.5	6.6	7.2	7.4	7.1	7.4	7.5	7.2	7.0	6.5	6.5	6.5	6.2	6.2	5.7	5.4	6.4
Port Angeles, Wash.	4.6	4.6	4.9	4.8	4.9	5.0	5.0	5.1	5.1	4.7	4.6	4.4	3.8	3.4	3.5	3.7	4.0	3.2	3.1	3.2	4.1	5.0	5.2	4.7	4.4
Port Huron, Mich.	9.1	9.6	9.3	9.1	9.6	9.9	9.8	9.9	10.0	10.5	11.2	11.8	11.5	11.9	12.6	12.5	11.7	11.0	10.9	11.3	10.7	10.4	10.0	12.6	10.6
Portland, Me.	7.8	7.8	7.8	7.4	7.1	7.3	7.2	7.2	7.8	8.6	8.7	8.6	8.2	8.5	8.0	7.6	6.6	6.9	7.2	7.4	7.9	8.4	8.1	8.2	7.8
Portland, Oreg.	8.5	8.4	8.4	8.9	8.6	8.9	8.9	8.5	8.7	8.4	8.5	8.4	9.4	9.9	9.6	9.6	9.0	8.6	8.1	7.5	7.4	8.3	8.1	8.5	8.6
Pueblo, Colo.	5.5	4.9	4.4	4.4	4.3	4.8	5.3	5.4	4.9	4.9	4.3	5.2	5.5	7.3	7.8	7.1	7.0	7.5	6.2	5.1	5.2	5.2	5.6	6.2	5.6
Raleigh, N. C.	5.9	6.0	6.0	6.4	6.2	5.8	5.7	5.5	6.0	6.7	7.4	7.4	7.7	7.6	7.2	6.7	5.9	5.8	5.6	5.8	5.9	5.7	5.7	5.7	6.3
Rapid City, S. Dak.	8.2	7.8	8.9	7.9	7.2	7.9	7.9	7.8	6.9	7.4	7.1	6.9	7.2	8.2	9.5	9.5	8.8	7.9	6.9	6.8	7.2	7.4	8.7	8.7	7.9
Redbluff, Cal.	5.4	5.8	5.1	5.1	5.4	5.8	5.3	6.0	5.8	5.7	6.0	5.4	5.8	6.5	6.4	7.1	7.0	6.1	5.8	5.6	5.1	5.3	4.5	5.3	5.7
Rochester, N. Y.	7.7	7.9	8.2	8.0	7.9	7.7	7.7	7.5	7.9	8.5	9.4	9.9	10.2	9.7	9.3	8.7	8.5	8.2	8.0	8.0	7.9	8.2	8.0	8.0	8.4
Roseburg, Oreg.	2.4	2.1	2.4	2.5	2.7	2.9	2.7	2.5	2.8	2.7	3.0	3.1	2.8	3.5	3.9	4.4	4.0	3.8	3.3	3.6	3.2	2.6	2.5	2.3	3.0
Sacramento, Cal.	7.0	7.0	7.0	7.5	6.7	7.1	6.9	6.7	7.1	7.8	7.7	7.9	8.5	8.9	9.3	9.1	9.0	8.5	8.0	6.9	6.3	7.1	7.0	6.5	7.6
St. Louis, Mo.	10.2	9.8	9.2	9.3	9.4	9.5	9.6	9.7	10.2	10.5	10.9	10.9	10.9	10.9	11.2	10.9	10.5	9.8	9.8	10.4	10.0	10.5	10.2	9.9	10.2
St. Paul, Minn.	6.5	6.0	5.7	5.7	5.8	5.7	5.7	5.6	3.7	5.8	6.1	6.3	7.3	7.5	7.4	7.2	7.1	6.3	6.0	6.2	6.3	6.2	6.3	6.8	6.3
Salt Lake City, Utah.	4.1	4.0	3.8	4.1	3.8	4.0	4.4	3.7	3.5	4.0	3.9	3.8	3.7	4.9	5.6	6.2	6.7	5.9	5.0	4.3	3.9	3.7	3.7	3.9	4.4
San Antonio, Tex.	6.5	6.6	6.5	6.8	6.5	6.6	7.0	6.8	6.5	6.7	7.8	9.2	9.4	9.9	9.9	9.7	9.4	8.9	7.5	7.0	7.1	7.0	7.0	5.9	7.6
San Diego, Cal.	2.4	2.4	2.3	2.7	2.7	3.0	3.1	3.1	2.9	2.9	2.7	2.4	2.4	3.3	5.1	6.2	6.8	6.7	6.1	4.6	3.1	2.8	2.5	2.4	3.5
Sandusky, Ohio	8.4	8.2	8.2	8.4	8.5	8.4	8.2	8.3	8.2	8.5	9.4	9.3	9.8	9.5	9.9	9.8	9.5	9.2	9.9	9.7	9.3	8.8	8.7	8.8	8.9
San Francisco, Cal.	7.1	7.0	6.3	6.0	6.2	5.8	6.1	6.9	7.5	7.6	7.4	6.9	7.6	8.2	8.0	9.0	9.4	9.1	9.2	9.3	9.5	8.8	8.0	7.5	7.7
San Luis Obispo, Cal.	3.7	3.4	3.6	3.2	4.3	4.5	4.7	3.9	4.1	3.6	3.7	3.1	3.9	5.0	5.8	6.4	6.3	6.1	5.2	4.9	4.3	4.4	4.2	3.5	4.4
Santa Fe, N. Mex.	5.0	5.1	5.2	5.5	5.1	4.7	5.1	5.4	6.2	5.8	6.1	7.0	7.5	7.5	8.3	8.5	8.0	7.4	5.0	3.3	4.2	4.0	4.5	5.1	5.8
Sault Ste Marie, Mich.	7.2	7.5	6.9	6.3	6.6	6.8	6.9	7.4	7.6	8.0	8.2	8.1	9.3	9.1	9.2	9.2	9.3	8.7	9.1	8.5	8.2	8.0	7.5	8.2	8.0
Savannah, Ga.	7.9	7.9	8.2	7.9	8.0	8.0	8.0	7.9	8.2	8.8	9.0	9.2	9.3	9.3	9.4	9.4	8.6	7.2	7.1	7.6	7.8	7.4	7.5	8.0	8.2
Seattle, Wash.	6.5	6.7	6.4	6.5	6.4	6.8	7.2	6.8	6.9	6.6	6.7	6.8	7.0	6.8	7.3	7.5	6.9	6.3	6.1	6.7	6.5	7.0	6.6	6.4	6.7
Shreveport, La.	6.0	6.3	6.0	5.4	5.5	6.1	6.4	5.9	5.6	5.7	6.5	6.5	7.4	7.4	7.6	7.3	7.5	7.2	6.1	6.2	6.1	6.0	6.3	6.1	6.4
Sioux City, Iowa	7.7	8.4	8.5	8.9	8.9	8.8	8.4	8.8	9.0	8.8	9.1	9.1	9.6	10.5	10.8	10.2	9.8	9.1	8.8	9.3	8.5	9.1	8.5	8.1	9.0
Spokane, Wash.	3.9	4.4	4.9	5.1	5.2	4.6	5.0	4.7	4.6	5.0	5.0	4.9	4.3	4.5	5.1	5.4	5.8	5.7	5.1	4.8	4.2	3.6	3.7	3.9	4.7
Springfield, Ill.	8.3	8.4	8.3	7.7	7.9	8.5	8.6	8.6	8.8	9.4	10.3	10.7	11.1	11.3	11.0	10.4	9.7	8.8	8.7	8.7	9.0	9.3	9.4	8.6	9.2
Springfield, Mo.	9.5	9.9	10.2	9.6	9.7	10.2	9.8	9.2	9.8	10.4	10.6	11.3	11.1	11.0	11.4	11.2	10.6	9.6	9.5	9.4	9.8	10.1	9.7	10.0	10.1
Tampa, Fla.	6.0	6.1	6.2	5.7	6.1	5.7	6.3	6.5	6.8	7.3	7.7	7.7	9.1	8.1	8.4	8.3	7.3	5.6	5.7	5.6	5.6	5.5	5.5	5.1	6.6
Tatoosh Island, Wash.	19.9	22.8	21.7	21.6	20.3	18.4	16.4	18.1	17.4	17.9	18.3	17.6	16.7	18.3	18.6	18.1	18.6	18.1	17.5	18.6	19.4	18.9	19.6	19.4	18.8
Toledo, Ohio	8.9	9.0	8.7	8.7	8.5	8.5	8.2	8.5	9.4	9.5	10.1	10.6	10.9	11.3	10.8	10.8	10.1	9.5	9.2	8.7	9.4	8.9	8.9	8.5	9.4
Vicksburg, Miss.	7.2	7.3	7.3	7.5	7.4	7.2	7.2	6.8	6.8	7.1	7.7	6.8	7.0	6.3	6.8	6.6	6.7	5.9	5.9	6.3	6.5	6.4	6.9	6.6	6.8
Vineyard Haven, Mass.	9.8	9.5	10.0	10.3	9.9	10.5	10.6	10.8	11.1	12.1	12.3	12.4	12.7	12.4	11.9	10.8	9.6	9.8	9.8	9.4	9.4	9.9	9.6	9.9	10.6
Walla Walla, Wash.	4.5	5.5	5.8	5.4	4.9	5.5	5.5	5.1	4.8	5.0	5.6	5.4	5.0	5.1	5.1	5.2	4.2	4.5	4.4	4.1	4.3	4.0	4.4	4.5	4.9
Washington, D. C.	5.9	5.6	5.4	5.3	4.8	5.3	5.7	5.9	6.2	8.4	8.8	9.8	9.7	9.4	9.6	8.6	6.9	6.0	5.3	5.5	5.1	5.7	5.6	6.1	6.7
Wichita, Kans.	6.6	6.2	6.5	6.6	6.6	7.1	7.0	6.9	7.2	7.6	8.5	8.7	9.4	10.3	10.5	10.2	9.4	7.9	6.9	6.5	6.8	6.3	6.5	6.8	7.6
Williston, N. Dak.	5.7	6.0	6.1	5.3	5.1	5.7	6.0	5.8	4.8	6.0	6.3	6.0	5.9	7.2	8.5	8.0	8.0	7.5	6.5	6.9	7.0	6.5	6.0	5.4	6.3
Wilmington, N. C.	7.9	8.2	7.7	7.6	7.5	7.5	7.4	7.5	8.2	8.6	9.2	8.9	9.8	9.8	9.1	8.5	7.9	6.8	6.8	7.0	7.4	7.3	6.9	7.1	7.9
Winnemucca, Nev.	8.1	8.4	8.1	7.8	6.6	7.0	8.0	7.8	7.8	8.8	8.9	7.6	8.1	9.7	10.8	10.7	10.3	10.7	9.5	9.0	9.0	8.4	8.4	8.0	8.7
Woods Hole, Mass.	18.5	18.4	18.7	19.0	19.3	18.9	18.4	19.3	19.7	19.7	19.2	18.8	19.7	19.6	19.0	18.3	17.4	17.3	18.0	17.5	18.1	18.2	17.8	18.5	18.6
Yuma, Ariz.	4.1	4.1	4.4	4.1	4.2	4.9	5.6	5.9	5.7	5.4	5.6	6.1	7.1	8.3	9.1	9.6	9.6	8.9	8.4	6.4	5.5	5.2	5.6	5.1	6.2

*For 27 days.

TABLE VIII.—This table is now made out by the River and Flood Service, and is, therefore, published on page 452.

TABLE IX.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during December, 1896.*

Stations.*	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	Hours.	Hours.	Hours.	°	Hours.
New England.						
Eastport, Me	29	11	3	32	n. 58 w.	34
Portland, Me	28	9	4	34	n. 58 w.	36
Northfield, Vt	31	21	3	9	n. 31 w.	12
Boston, Mass	18	16	4	39	n. 87 w.	35
Nantucket, Mass	33	11	9	26	n. 38 w.	28
Woods Hole, Mass.*	11	9	3	16	n. 81 w.	13
Block Island, R. I	30	8	16	28	n. 29 w.	25
New Haven, Conn	29	14	2	26	n. 58 w.	28
Middle Atlantic States.						
Albany, N. Y	27	25	3	16	n. 81 w.	13
Binghamton, N. Y†	16	4	9	10	n. 5 w.	12
New York, N. Y	23	15	5	31	n. 55 w.	32
Harrisburg, Pa	16	10	17	32	n. 68 w.	16
Philadelphia, Pa	25	12	4	33	n. 66 w.	32
Atlantic City, N. J	28	12	4	31	n. 59 w.	31
Baltimore, Md	19	13	13	31	n. 72 w.	19
Washington, D. C	27	20	8	18	n. 55 w.	12
Lynchburg, Va	22	19	9	31	n. 82 w.	22
Norfolk, Va	27	18	13	21	n. 42 w.	12
South Atlantic States.						
Charlotte, N. C	17	21	28	9	s. 78 e.	19
Hatteras, N. C	39	6	7	18	n. 18 w.	35
Kittyhawk, N. C.‡	25	12	7	18	n. 40 w.	17
Raleigh, N. C	29	12	6	22	n. 43 w.	23
Wilmington, N. C	34	10	9	19	n. 23 w.	26
Charleston, S. C	35	6	19	14	n. 10 e.	29
Augusta, Ga	36	10	10	23	n. 27 w.	29
Savannah, Ga	36	10	15	18	n. 7 w.	26
Jacksonville, Fla	41	7	11	14	n. 5 w.	34
Florida Peninsula.						
Jupiter, Fla	20	7	19	28	n. 35 w	16
Key West, Fla	35	5	36	6	n. 45 e.	42
Tampa, Fla	41	4	7	12	n. 8 e.	37
Eastern Gulf States.						
Atlanta, Ga	23	10	19	23	n. 17 w.	14
Pensacola, Fla	35	4	27	7	n. 33 e.	37
Mobile, Ala	37	14	12	8	n. 10 e.	23
Montgomery, Ala	23	11	25	12	n. 47 e.	18
Vicksburg, Miss	22	20	26	9	n. 83 e.	17
New Orleans, La	34	12	24	8	n. 36 e.	27
Western Gulf States.						
Shreveport, La	17	25	17	17	s.	8
Fort Smith, Ark	14	14	32	12	e.	20
Little Rock, Ark	19	23	14	21	s. 60 w	8
Corpus Christi, Tex	27	19	16	16	n.	8
Galveston, Tex	22	14	25	12	n. 58 e.	15
Palestine, Tex	24	22	20	10	n. 79 e.	10
San Antonio, Tex	27	15	20	9	n. 43 e.	16
Ohio Valley and Tennessee.						
Chattanooga, Tenn	24	17	19	19	n.	7
Knoxville, Tenn	32	11	20	17	n. 8 e.	21
Memphis, Tenn	18	26	19	11	s. 45 e.	11
Nashville, Tenn	22	18	17	18	n. 14 w.	4
Lexington, Ky	13	28	15	21	s. 22 w.	21
Louisville, Ky	17	28	14	16	s. 10 w.	11
Indianapolis, Ind	19	25	11	18	s. 49 w.	9
Cincinnati, Ohio	18	22	18	17	s. 14 e.	4
Columbus, Ohio	21	21	11	26	w.	15
Pittsburg, Pa	14	21	10	29	s. 70 w.	20
Parkersburg, W. Va	14	26	16	19	s. 14 w.	12
Lower Lake Region.						
Buffalo, N. Y	17	14	16	28	n. 76 w.	12
Oswego, N. Y	17	28	22	14	s. 36 e.	14
Rochester, N. Y	10	26	10	28	s. 48 w.	24
Erie, Pa	15	23	13	26	s. 58 w.	15
Cleveland, Ohio	15	28	14	20	s. 25 w.	14
Sandusky, Ohio	17	13	9	35	n. 81 w.	26
Toledo, Ohio	14	18	12	31	s. 78 w.	19
Detroit, Mich	17	20	8	30	s. 82 w.	22
Upper Lake Region.						
Alpena, Mich	16	23	9	29	s. 71 w.	21
Grand Haven, Mich	16	22	26	16	s. 59 e.	12
Marquette, Mich	17	15	9	31	n. 85 w.	22
Port Huron, Mich	14	28	10	24	s. 45 w.	20
Sault Ste. Marie, Mich	12	25	24	17	s. 28 e.	15
Chicago, Ill	16	19	6	32	s. 83 e.	26
Upper Lake Region—Cont'd.						
Milwaukee, Wis	21	19	9	29	n. 84 w.	20
Greenbay, Wis	13	34	4	24	s. 44 w.	29
Duluth, Minn	20	21	7	34	s. 88 w.	27
North Dakota.						
Moorhead, Minn	18	29	8	19	s. 45 w.	16
Bismarck, N. Dak	26	12	21	21	n.	14
Williston, N. Dak	18	22	15	24	s. 66 w.	10
Upper Mississippi Valley.						
St. Paul, Minn	10	30	17	21	s. 11 w.	20
La Crosse, Wis.†	9	13	5	10	s. 51 w.	6
Davenport, Iowa	20	20	16	23	w.	7
Des Moines, Iowa	19	20	12	25	s. 86 w.	13
Dubuque, Iowa	17	25	14	20	s. 37 w.	10
Keokuk, Iowa	19	24	14	23	s. 61 w.	10
Cairo, Ill	21	27	15	11	s. 34 e.	7
Springfield, Ill	18	28	11	17	s. 31 w.	12
Hannibal, Mo	15	28	14	25	s. 40 w.	17
St. Louis, Mo	16	29	12	14	s. 9 w.	13
Missouri Valley.						
Columbia, Mo.*	5	13	8	11	s. 21 w.	8
Kansas City, Mo	20	23	15	20	s. 59 w.	6
Springfield, Mo	15	27	20	18	s. 9 e.	12
Omaha, Nebr	22	22	7	24	w.	17
Sioux City, Iowa†	12	12	5	7	w.	2
Pierre, S. Dak	14	18	27	16	s. 70 e.	12
Huron, S. Dak	16	28	14	18	s. 18 w.	13
Northern Slope.						
Havre, Mont	15	14	13	33	n. 87 w.	20
Miles City, Mont	11	25	15	22	s. 27 w.	16
Helena, Mont	8	27	3	41	s. 63 w.	42
Rapid City, S. Dak	11	28	12	33	s. 51 w.	27
Cheyenne, Wyo	28	10	0	39	n. 65 w.	43
Lander, Wyo	12	30	9	27	s. 45 w.	26
North Platte, Nebr	10	18	7	36	s. 75 w.	30
Middle Slope.						
Denver, Colo	12	32	6	18	s. 31 w.	23
Pueblo, Colo	25	8	17	27	n. 30 w.	20
Concordia, Kans	12	31	10	21	s. 30 w.	22
Dodge City, Kans	21	25	7	17	s. 68 w.	11
Wichita, Kans	22	29	10	8	s. 16 e.	7
Oklahoma, Okla	18	30	10	17	s. 30 w.	14
Southern Slope.						
Abilene, Tex	16	30	10	20	s. 36 w.	17
Amarillo, Tex	22	26	8	18	s. 68 w.	11
Southern Plateau.						
El Paso, Tex	25	6	16	29	n. 34 w.	23
Santa Fe, N. Mex	27	14	35	5	n. 67 e.	33
Phœnix, Ariz	6	21	22	19	s. 11 e.	15
Yuma, Ariz	35	5	24	6	n. 31 e.	35
Middle Plateau.						
Carson City, Nev	16	22	17	22	s. 40 w.	8
Winnemucca, Nev	13	20	27	16	s. 52 e.	11
Salt Lake City, Utah	11	22	26	18	s. 36 e.	14
Northern Plateau.						
Baker City, Oreg	7	39	22	10	s. 21 e.	34
Idaho Falls, Idaho	36	14	4	16	n. 29 w.	25
Spokane, Wash	20	22	16	14	s. 45 e.	3
Walla Walla, Wash	4	39	11	16	s. 8 w.	35
North Pacific Coast Region.						
Fort Canby, Wash	7	36	26	8	s. 32 e.	34
Port Angeles, Wash.*	1	17	13	7	s. 21 e.	17
Seattle, Wash	9	39	23	2	s. 35 e.	37
Tatoosh Island, Wash	7	29	29	5	s. 48 e.	33
Portland, Oreg	12	32	18	13	s. 14 e.	21
Roseburg, Oreg	12	29	21	15	s. 19 e.	18
Middle Pacific Coast Region.						
Eureka, Cal	12	23	28	14	s. 52 e.	18
Redbluff, Cal	24	20	18	21	n. 37 w.	5
Sacramento, Cal	20	26	23	15	s. 53 e.	10
San Francisco, Cal	29	13	9	22	n. 39 w.	21
South Pacific Coast Region.						
Fresno, Cal	17	18	20	26	s. 80 w.	6
Los Angeles, Cal	31	6	20	22	n. 5 w.	25
San Diego, Cal	32	5	22	19	n. 6 e.	27
San Luis Obispo, Cal	31	20	9	7	n. 10 e.	11

*From observations at 8 p. m. only. †From observations at 8 a. m. only. ‡For 27 days.

TABLE X.—*Thunderstorms and auroras, December*, 1896.

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	53	T.								1						8	1																	10	3	T.
		A.																																0	0	A.
Arizona	48	T.																																0	0	T.
		A.																																0	0	A.
Arkansas	51	T.								1																								1	1	T.
		A.																																0	0	A.
California	197	T.																														3	1	4	2	T.
		A.																																0	0	A.
Colorado	70	T.																															2	2	1	T.
		A.			4																													4	1	A.
Connecticut	22	T.																																0	0	T.
		A.			8												1																	9	2	A.
Delaware	6	T.																																0	0	T.
		A.			2																					1								3	2	A.
Dist. of Columbia	4	T.																																0	0	T.
		A.			1																													1	1	A.
Florida	38	T.														1																		1	1	T.
		A.																																0	0	A.
Georgia	49	T.														4																		4	1	T.
		A.																																0	0	A.
Idaho	36	T.					1										1												1			1		4	4	T.
		A.			1	1						1	1																			1		5	5	A.
Illinois	97	T.								2						2																		4	2	T.
		A.	1		2																				1									4	3	A.
Indiana	48	T.																																0	0	T.
		A.			1	1						1																						3	3	A.
Indian Territory	6	T.																														1		1	1	T.
		A.																																0	0	A.
Iowa	101	T.																																0	0	T.
		A.			4																													4	1	A.
Kansas	73	T.																																0	0	T.
		A.			13			1																										14	2	A.
Kentucky	47	T.								1						8				1														10	3	T.
		A.																																0	0	A.
Louisiana	48	T.	1						1						1	2	1							1								10		17	7	T.
		A.																																0	0	A.
Maine	16	T.																																0	0	T.
		A.	1		5						1												1											8	4	A.
Maryland	31	T.																																0	0	T.
		A.			11	3																												14	2	A.
Massachusetts	77	T.																																0	0	T.
		A.			22	1																										1		24	3	A.
Michigan	96	T.																																0	0	T.
		A.			2								1	1	4	2			1										1					12	7	A.
Minnesota	69	T.																																0	0	T.
		A.																											1				1	2	2	A.
Mississippi	52	T.								1						4																		5	2	T.
		A.																																0	0	A.
Missouri	96	T.							1	1					1	1														1		1	2	8	7	T.
		A.	1		9	1																												11	3	A.
Montana	40	T.																																0	0	T.
		A.			2	3	2	1						1	1	1														1			1	13	9	A.
Nebraska	112	T.																1																1	1	T.
		A.			20	1	1					1			1											1								25	6	A.
Nevada	39	T.																																0	0	T.
		A.																							1									1	1	A.
New Hampshire	23	T.																																0	0	T.
		A.			6	2			1						1														3					13	5	A.
New Jersey	54	T.																																0	0	T.
		A.			13																													13	1	A.
New Mexico	36	T.																													10	3		13	2	T.
		A.																																0	0	A.
New York	93	T.																																0	0	T.
		A.			17	3	1									1			1		1							2	2					28	8	A.
North Carolina	60	T.																								1								1	1	T.
		A.																																0	0	A.
North Dakota	39	T.													1																			1	1	T.
		A.	3		7		1	2																					1					14	5	A.
Ohio	140	T.																																0	0	T.
		A.			8	6	1	1	1				1	2	1				1						1		2							25	11	A.
Oklahoma	20	T.																																0	0	T.
		A.																																0	0	A.
Oregon	60	T.																													1	5	1	7	3	T.
		A.																																0	0	A.
Pennsylvania	93	T.																																0	0	T.
		A.		1	5										1																			7	3	A.
Rhode Island	6	T.																																0	0	T.
		A.			3																													3	1	A.
South Carolina	42	T.														5																		5	1	T.
		A.																																0	0	A.
South Dakota	46	T.																																0	0	T.
		A.			6														1										1					8	3	A.
Tennessee	49	T.														14																		14	1	T.
		A.																																0	0	A.
Texas	91	T.																												1	2	14	6	23	4	T.
		A.																																0	0	A.
Utah	32	T.																		1												1		2	2	T.
		A.																																0	0	A.
Vermont	13	T.																																0	0	T.
		A.			7											1	1	1											2					12	5	A.
Virginia	37	T.																																0	0	T.
		A.			2																													2	1	A.
Washington	51	T.																																0	0	T.
		A.				1																												1	1	A.
West Virginia	37	T.																																0	0	T.
		A.			2										2																			4	2	A.
Wisconsin	58	T.																																0	0	T.
		A.																											2					2	1	A.
Wyoming	11	T.																																0	0	T.
		A.																																0	0	A.
Sums	2,713	T.	1	0	0	0	1	0	2	7	0	0	0	0	3	49	3	1	0	2	0	0	0	1	0	1	0	0	1	2	13	39	12	137	....	T.
		A.	6	1	183	23	6	5	2	0	1	3	3	4	11	5	2	1	4	0	1	0	1	0	3	2	2	2	13	1	0	2	2	289	....	A.

TABLE XI.—*Hourly sunshine as deduced from sunshine recorders, December, 1896.*

Stations.	Instrument.	A. M. 5	6	7	8	9	10	11	Noon	P. M. 1	2	3	4	5	6	7	8	Monthly summary. Instrumental record. Actual.	Possible.	Per cent of possible.	Personal estimate.
																		Hours.	Hours.		
Albany, N. Y	T.	......	......	......	45	48	59	65	72	77	72	60	44	21	......	......	......	165.4	281.0	59	37
Atlanta, Ga	T.	......	......	33	42	42	48	54	64	73	67	63	61	62	33	......	......	176.5	307.7	57	59
Baltimore, Md	T.	......	......	......	20	23	31	46	56	57	44	37	23	20	......	......	......	107.5	293.7	37	34
Binghamton, N. Y	T.	......	......	......	17	18	27	36	37	39	35	28	24	19	......	......	......	82.6	284.7	29	26
Bismarck, N. Dak	P.	......	......	......	38	42	45	53	51	49	55	45	40	41	......	......	......	124.1	265.6	47	45
Boston, Mass	T.	......	......	......	44	62	71	71	76	78	72	59	53	38	......	......	......	183.5	284.7	64	50
Buffalo, N. Y	T.	......	......	......	0	1	11	16	20	28	35	26	7	0	......	......	......	44.5	281.0	16	15
Chattanooga, Tenn	T.	......	......	18	22	24	36	52	55	61	58	55	52	49	......	......	......	141.0	305.2	46	51
Cheyenne, Wyo	P.	......	......	......	49	62	76	75	63	57	60	50	51	52	......	......	......	173.6	287.8	60	47
Chicago, Ill	T.	......	......	......	23	18	31	32	37	33	32	25	18	21	......	......	......	78.3	284.7	28	28
Cincinnati, Ohio	T.	......	......	......	27	28	35	35	45	50	47	41	33	34	......	......	......	110.9	293.7	38	42
Cleveland, Ohio	T.	......	......	......	2	5	27	31	31	32	31	25	14	9	......	......	......	62.2	284.7	22	22
Columbus, Ohio	T.	......	......	......	0	2	12	27	32	32	34	30	27	25	......	......	......	66.0	291.7	23	30
Denver, Colo	P.	......	......	......	56	64	72	77	68	69	76	76	64	62	......	......	......	201.2	291.7	69	50
Des Moines, Iowa	T.	......	......	......	43	44	39	48	51	55	50	47	50	49	......	......	......	135.7	284.7	48	45
Detroit, Mich	T.	......	......	......	22	21	31	42	45	46	46	30	23	21	......	......	......	96.4	284.7	34	27
Dodge City, Kans	P.	......	......	0	48	60	68	75	74	70	73	73	67	42	......	......	......	197.2	296.7	66	62
Dubuque, Iowa	T.	......	......	......	15	13	17	29	34	35	29	29	24	21	......	......	......	71.2	284.7	25	26
Eastport, Me	P.	......	......	......	25	33	53	58	53	60	60	65	56	50	......	......	......	144.2	274.3	53	42
Eureka, Cal	P.	......	......	......	20	25	24	24	32	40	41	33	21	9	......	......	......	80.2	287.8	28	35
Fresno, Cal	T.	......	......	20	20	27	36	55	63	60	56	64	63	57	......	......	......	150.0	299.4	50	47
Galveston, Tex	P.	......	......	30	43	65	67	69	70	68	71	75	70	55	34	......	......	205.6	320.2	64	61
Helena, Mont	P.	......	......	......	28	29	37	43	39	50	48	38	34	36	......	......	......	104.1	265.6	39	35
Indianapolis, Ind	T.	......	......	......	25	38	51	66	70	70	66	60	41	25	......	......	......	154.1	291.7	53	36
Kansas City, Mo	P.	......	......	......	44	45	52	55	51	50	51	46	35	51	......	......	......	141.4	293.7	48	51
Little Rock, Ark	T.	......	......	55	58	66	79	80	83	83	81	75	67	64	......	......	......	225.4	305.2	74	56
Los Angeles, Cal	P.	......	......	83	67	76	81	68	73	82	77	79	64	54	......	......	......	222.3	307.7	72	65
Louisville, Ky	T.	......	......	100	43	43	59	63	68	70	71	51	44	42	......	......	......	166.2	296.7	56	41
Minneapolis, Minn	T.	......	......	......	13	16	30	32	35	30	29	26	21	20	......	......	......	71.9	274.3	26	......
New Orleans, La	T.	......	......	24	34	38	37	49	60	63	63	62	53	46	52	......	......	158.6	317.8	50	47
New York, N. Y	T.	......	......	......	39	52	68	79	78	82	81	65	55	35	......	......	......	188.5	287.8	65	51
Northfield, Vt	P.	......	......	......	25	31	47	46	44	52	48	45	27	27	......	......	......	113.1	277.7	41	38
Omaha, Nebr	P.	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	45
Philadelphia, Pa	T.	......	......	......	58	66	73	80	82	81	78	62	60	52	......	......	......	204.5	291.7	70	53
Phœnix, Ariz	P.	......	......	64	56	73	83	77	75	86	89	85	83	87	96	......	......	246.3	310.7	79	73
Portland, Me	T.	......	......	......	11	46	60	74	77	79	78	71	54	28	......	......	......	172.2	277.7	62	48
Portland, Oreg	T.	......	......	......	2	6	11	17	23	22	21	9	5	1	......	......	......	35.6	269.6	13	21
Do	P.	......	......	......	2	4	9	15	17	16	15	12	1	1	......	......	......	28.1	269.6	10	21
Raleigh, N. C	T.	......	......	17	29	50	66	78	78	74	73	72	64	54	......	......	......	194.1	302.5	64	55
Rochester, N. Y	T.	......	......	......	6	13	22	31	29	30	30	21	14	16	......	......	......	59.2	281.0	21	19
St. Louis, Mo	T.	......	......	......	40	49	57	58	59	65	66	63	57	45	......	......	......	166.5	293.7	57	42
Salt Lake City, Utah	P.	......	......	......	40	43	51	53	44	59	59	63	47	43	......	......	......	146.8	287.8	51	27
San Diego, Cal	P.	......	......	64	71	72	76	87	80	78	84	82	83	69	67	......	......	242.9	310.7	78	66
San Francisco, Cal	T.	......	......	......	5	32	52	60	62	64	60	55	30	18	......	......	......	134.0	296.7	45	38
Santa Fe, N. Mex	P.	......	......	83	66	80	80	84	81	84	79	72	65	51	......	......	......	225.7	302.5	75	64
Savannah, Ga	P.	......	......	52	57	60	61	62	64	71	64	58	60	49	33	......	......	189.3	313.0	60	63
Seattle, Wash	T.	......	......	......	0	1	8	12	16	22	23	19	5	0	......	......	......	32.9	262.1	13	16
Tampa, Fla	T.	......	......	32	39	43	54	64	67	66	68	63	50	48	48	......	......	178.7	322.9	55	55
Vicksburg, Miss	T.	......	......	52	57	61	69	73	79	84	85	82	76	72	67	......	......	230.2	313.0	74	61
Washington, D. C	P.	......	......	......	49	53	61	61	70	68	71	68	55	52	......	......	......	179.9	293.7	61	53
Wilmington, N. C	T.	......	......	11	32	59	61	75	71	78	72	66	58	46	67	......	......	190.2	307.7	62	57

TABLE XII.—*Maximum rainfall in one hour or less, December, 1896.*

Stations.	Maximum rainfall in— 5 min.	Date.	10 min.	Date.	1 hour.	Date.	Stations.	Maximum rainfall in— 5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		Inch.		Inch.			Inch.		Inch.		Inch.	
Atlanta, Ga †	0.01	2	0.03	2	0.15	2	Milwaukee, Wis	......	......	......	......	0.08	22
Baltimore, Md	......	......	......	......	0.05	22	Nantucket, Mass	0.07	15	0.12	15	0.27	15
Bismarck, N. Dak ‡	......	......	......	......	......	......	Nashville, Tenn	0.23	14	0.40	14	0.57	14
Boston, Mass	0.02	9	0.04	9	0.13	9	New Orleans, La	0.25	31	0.37	31	0.80	31
Buffalo, N. Y †	0.01	22	0.02	22	0.19	8	New York, N. Y *	......	......	......	......	......	......
Chicago, Ill *	......	......	......	......	......	......	Norfolk, Va	0.03	15	0.05	15	0.19	15
Cincinnati, Ohio	0.02	8, 14	0.03	8, 14	0.15	8	Omaha, Nebr	0.07	31	0.08	31	0.16	31
Cleveland, Ohio	0.01	8	0.02	8	0.11	15	Philadelphia, Pa †	0.02	16	0.04	16	0.11	16
Denver, Colo	0.01	6-7	0.01	6-7	0.04	6-7	Pittsburg, Pa ‡	......	......	......	......	......	......
Detroit, Mich	0.03	9	0.06	9	0.07	9	Portland, Me	0.06	9	0.07	9	0.20	9
Dodge City, Kans *	......	......	......	......	......	......	Portland, Oreg	0.03	12	0.06	12	0.23	12
Duluth, Minn ‡	......	......	......	......	......	......	Rochester, N. Y	0.01	8	0.02	8	0.11	8
Eastport, Me	0.03	9	0.05	9	0.15	9	St. Louis, Mo	0.05	7	0.06	6	0.22	7
Galveston, Tex	0.30	31	0.43	31	0.80	31	St. Paul, Minn	0.02	17	0.03	17	0.06	17
Indianapolis, Ind	0.02	14	0.03	14	0.12	14	Salt Lake City, Utah	......	......	0.01	5	0.06	5
Jacksonville, Fla	0.03	14	0.05	14	0.21	14	San Diego, Cal	0.32	18	0.47	18	0.79	18
Jupiter, Fla	0.17	10	0.25	10	0.46	10	San Francisco, Cal	0.05	15	0.10	15	0.30	15
Kansas City, Mo	0.04	31	0.06	31	0.18	31	Savannah, Ga	0.16	14	0.27	14	0.68	14
Key West, Fla	0.25	14	0.31	14	0.41	14	Seattle, Wash	0.05	12	0.09	12	0.42	12
Little Rock, Ark *	......	......	......	......	......	......	Vicksburg, Miss	0.07	8	0.10	8	0.25	8
Louisville, Ky *	......	......	......	......	......	......	Washington, D. C	0.01	15	0.02	15	0.07	15
Memphis, Tenn	0.03	8	0.05	8	0.17	8	Wilmington, N. C	0.03	2	0.05	2	0.29	2

* Self-register out of order. † Partly estimated. ‡ No record on account of snow.

TABLE XIII.—*Excessive precipitation, by stations, for December, 1896.*

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
California.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Bowmans Dam	10.31	2.70	11-12			
Crescent City	15.14	2.65	14			
Do		2.55	28			
Edmanton	11.13	2.85	14			
Eureka		2.69	27-28			
Fort Ross	13.95					
Laporte	12.88	3.50	12			
Do		2.59	14			
Middletown	11.21	3.15	15			
Redbluff		2.64	14-15			
Shasta	13.10					
Ukiah	10.60					
Upper Mattole	18.49	7.22	27-28			
Florida.						
Myers		2.65	9-10			
Tallahassee		4.78	1-2			
Georgia.						
Allentown		3.99	1-2			
Americus		2.82	1-2			
Brag		5.69	1-2			
Dublin		3.70	1-2			
Fleming		6.30	1-2			
Macon		2.70	1-2			
Milledgeville		3.10	1-2			
Morgan		4.50	1-2			
Piscola		5.90	1-2			
Quitman		6.08	1-2			
Savannah		3.93	1-2			
Thomasville		5.70	1-2			
Kansas.						
Fort Riley		2.60	31			
Louisiana.						
Lawrence		2.70	31			
Melville		2.50	31			
Sugar Experiment Station		2.60	1			
Thibodeaux		2.50	31			
New Mexico.						
Albert		3.05	29-30			
North Carolina.						
Falkland		3.00	15-16			
Oakridge		2.66	4			
Selma		2.50	15			
Oklahoma.						
Arapaho		2.59	30-31			
Mangum		2.67	30			
Oregon.						
Astoria	19.14	4.31	6-7			
Bandon		2.68	27			
Bay City	12.71					
Cascade Locks	14.85					
Falls City	16.29					
Forest Grove	10.45					

TABLE XIII.—*Excessive Precipitation.*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Oregon—Continued.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Gardiner	13.59					
Glenora	30.05	5.46	7			
Do		2.51	10			
Do		3.07	12			
Government Camp	14.77					
Langlois	16.21					
McMinnville	11.13					
Nehalem	19.81					
Newberg	11.65					
Newport	13.46					
Stafford	10.82					
Toledo	12.00					
Vernonia	10.35					
South Carolina.						
Charleston		3.40	1-2			
Edisto		3.92	1-2			
Gillisonville		4.17	1-2			
Pinopolis		4.13	1-2			
St. George		3.10	1-2			
St. Stephens		3.10	1-2			
Trial		4.01	1-2			
Yemassee		4.03	1-2			
Texas.						
Abilene				1.00	0.40	30
Amarillo		2.60	29-30			
Brady				1.10	0.50	30
Dublin		3.25	30-31			
Graham		3.00	30			
Haskell		2.60	30			
Houston		3.35	30-31			
Panter		2.56	30			
Virginia.						
Hampton		2.54	15-16			
Washington.						
Chehalis	10.63					
Clearwater	25.26	2.94	2			
Do		2.73	6			
Do		4.40	18			
Fort Canby	16.04	2.82	6-7			
Grandmound	12.20	3.22	6-7			
Lapush	19.15	2.50	3			
Mayfield	10.68					
North Bend	19.09	3.86	3			
Olympia	14.14					
Pysht	14.99					
Silvercreek	11.83					
Southbend	18.98	4.68	7			
Tacoma	11.11					
Tatoosh Island	19.91	4.00	2-3			
Do		4.28	18-19			
Union City	19.57	2.80	12			
Vashon	10.78					

Chart I. Tracks of Centers of Low Areas. December, 1896.

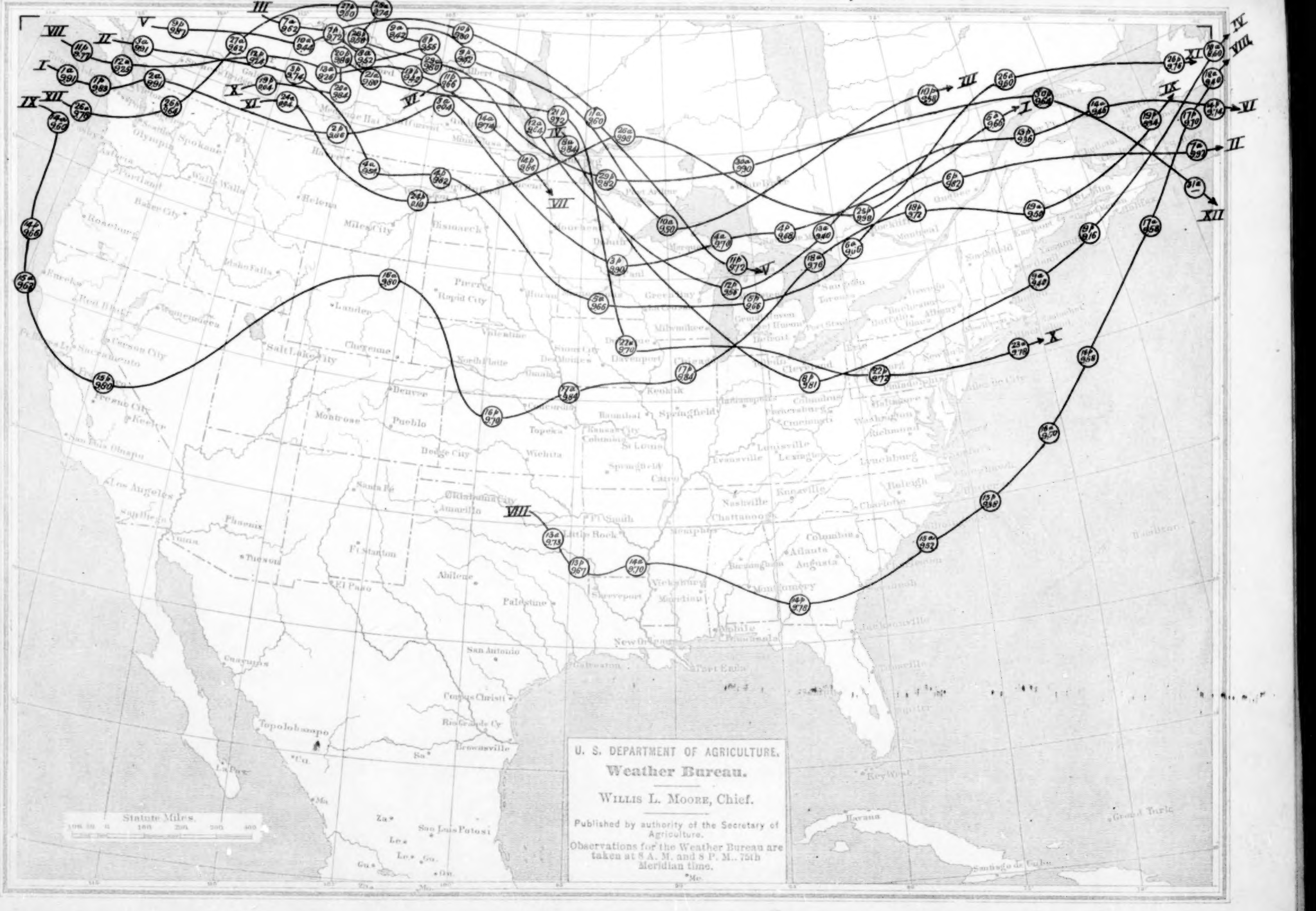

Chart II. Tracks of Centers of High Areas. December, 1896.

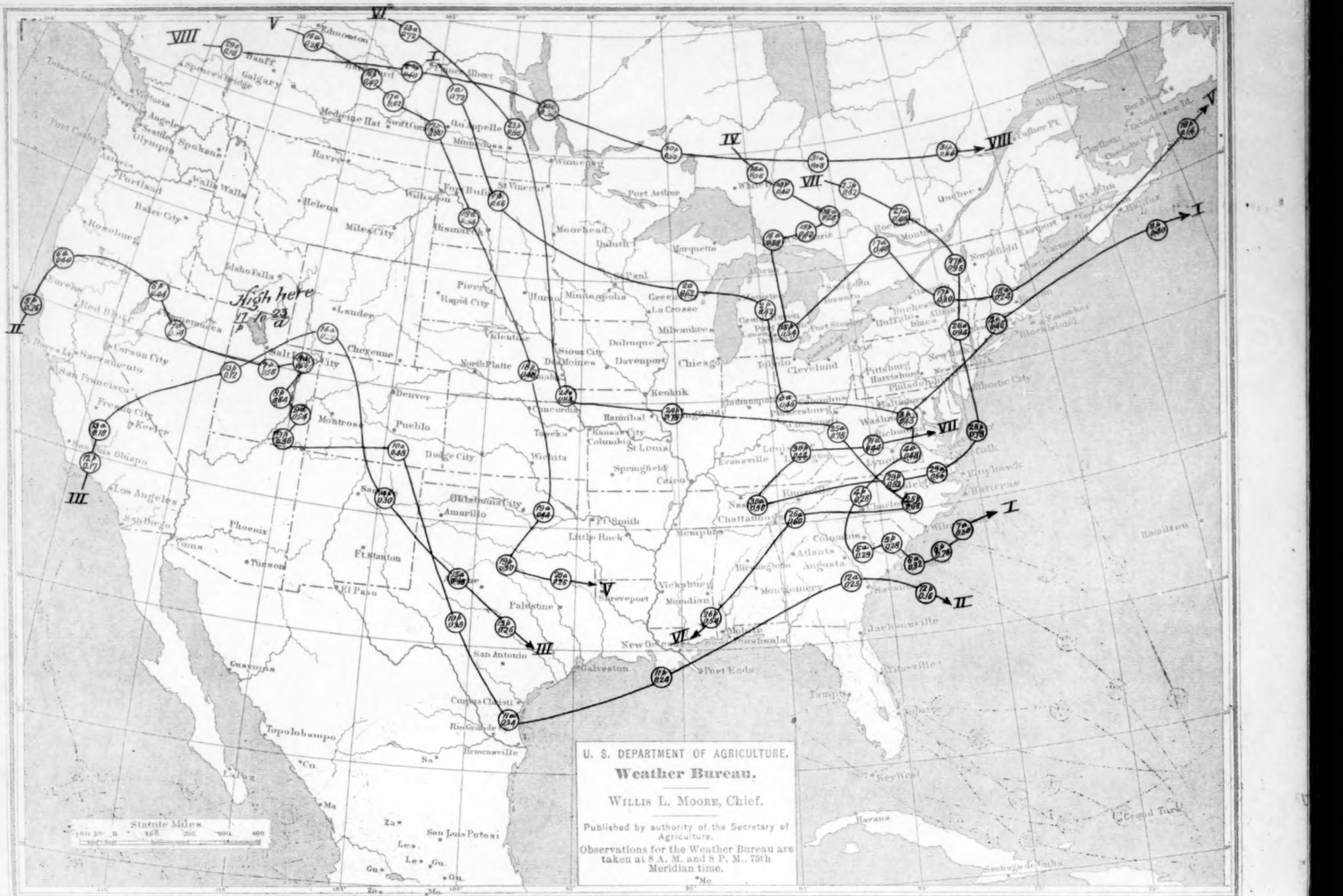

Chart III. Total Precipitation. December, 1896.

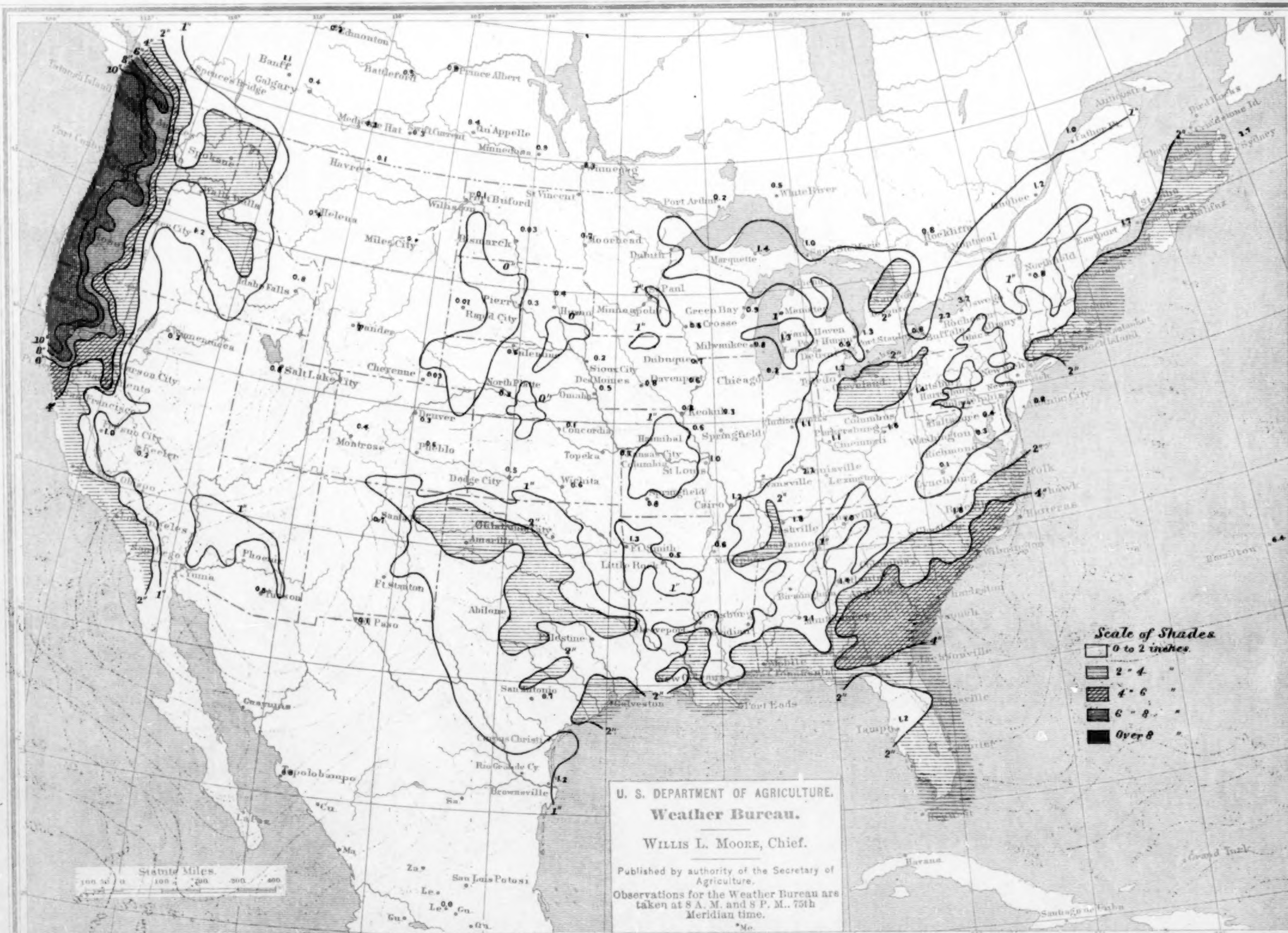

Chart IV. Isobars, Isotherms, and Resultant Winds. December, 1896.

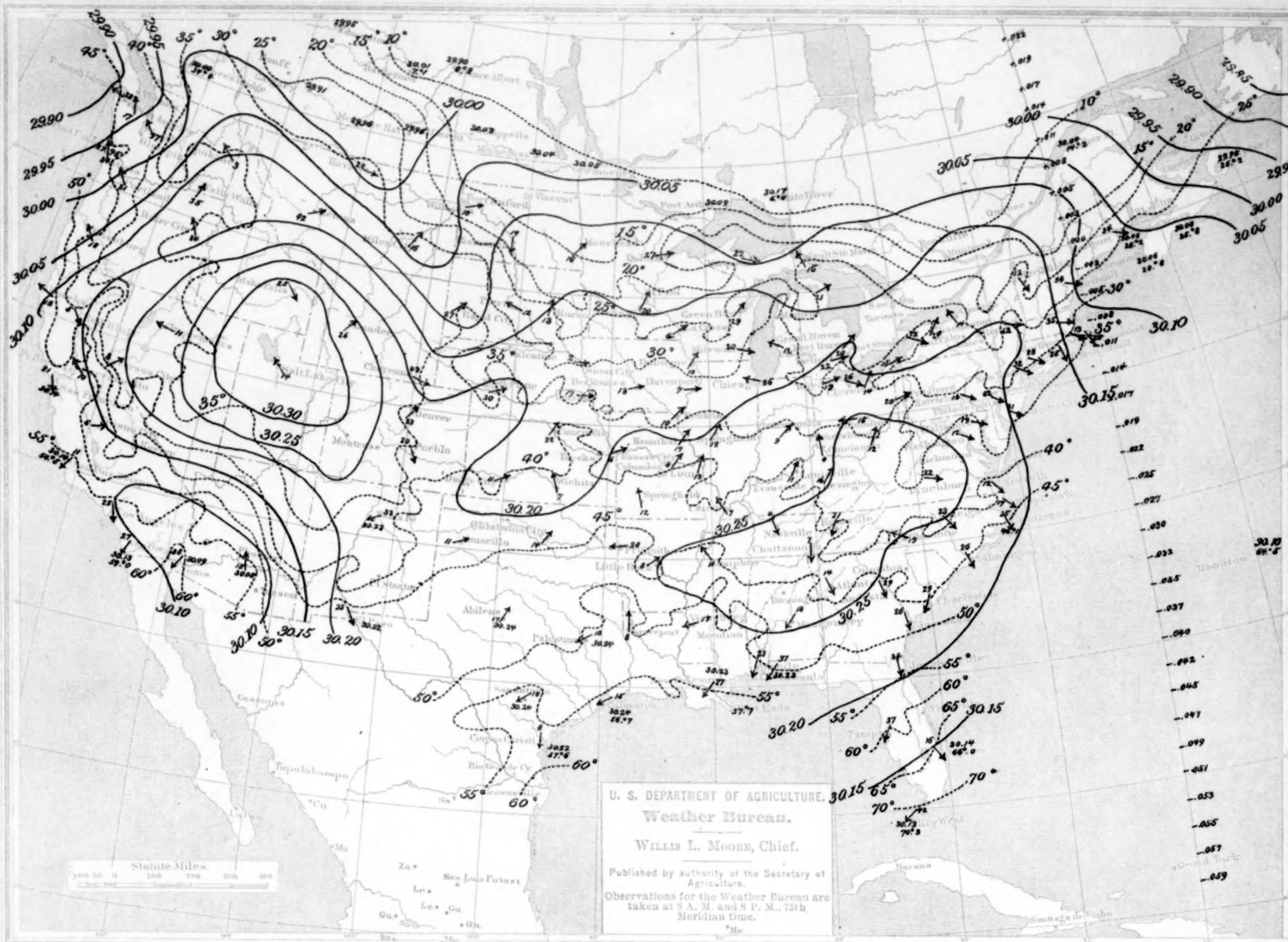

Chart V. Depth of Snowfall (inches) and Limits of Freezing Weather. December, 1896.

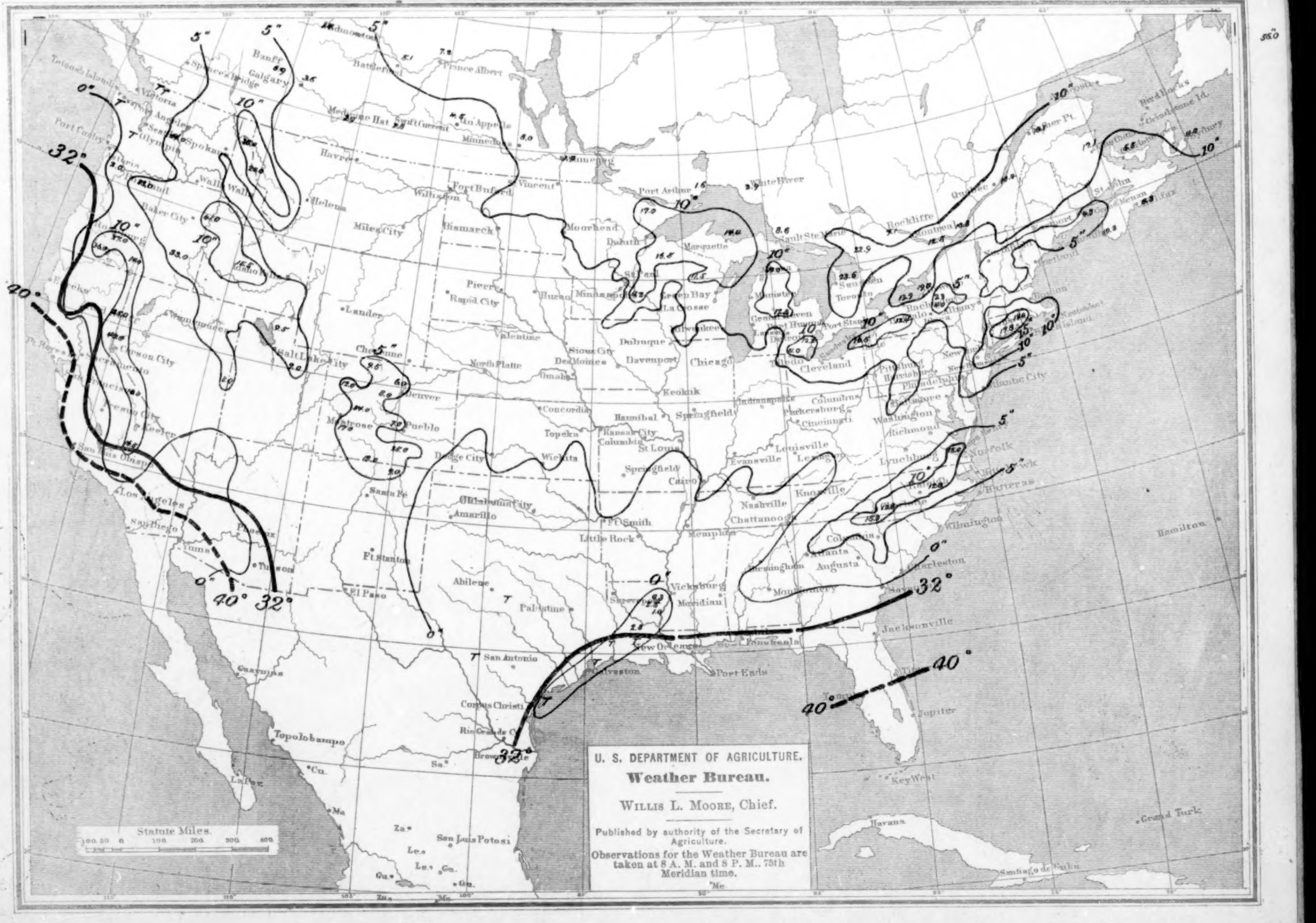

Chart VI. Depth of Snow on Ground at the Close of the Month. December, 1896.